American Machinist

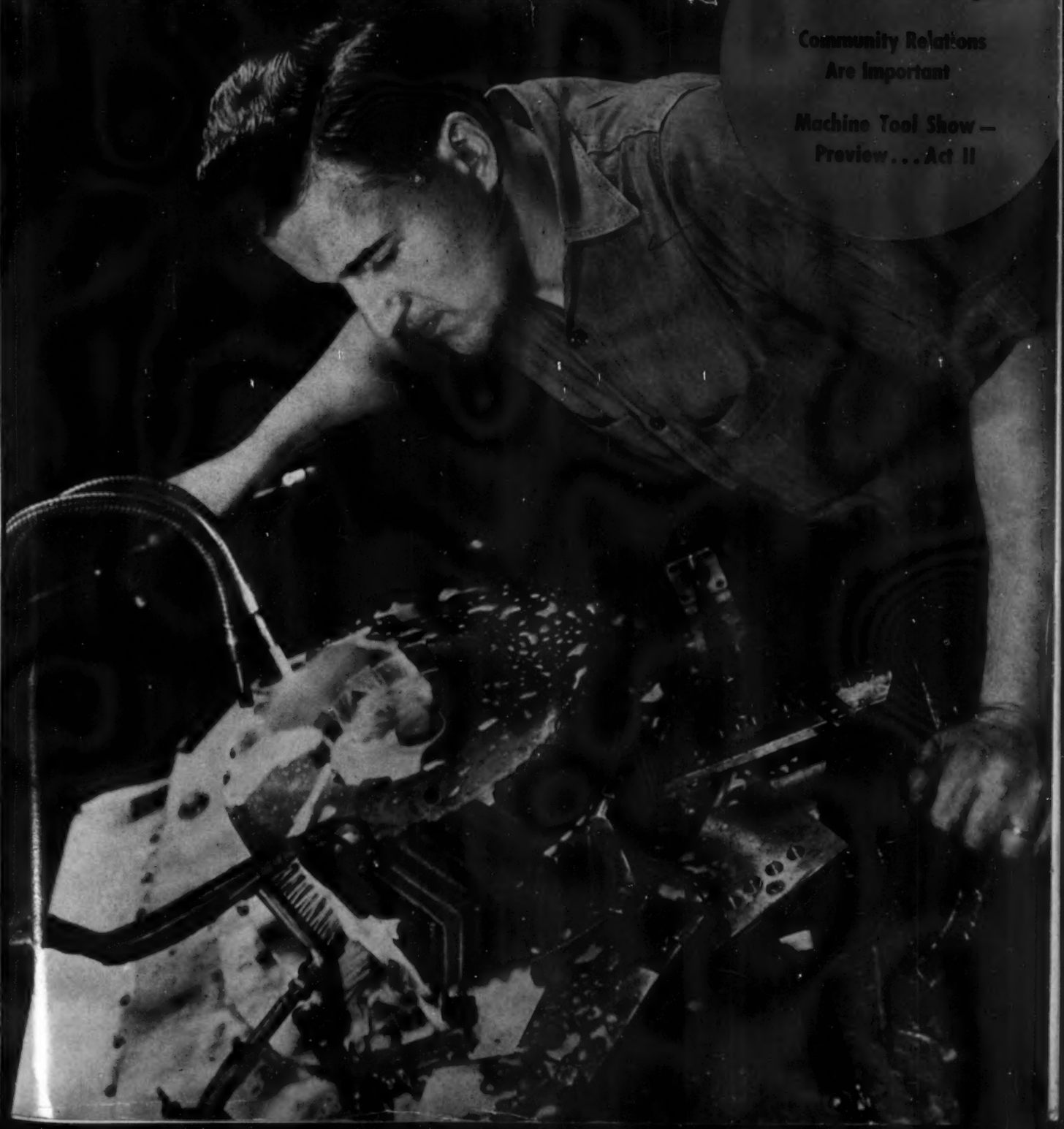
AUGUST 14, 1947

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

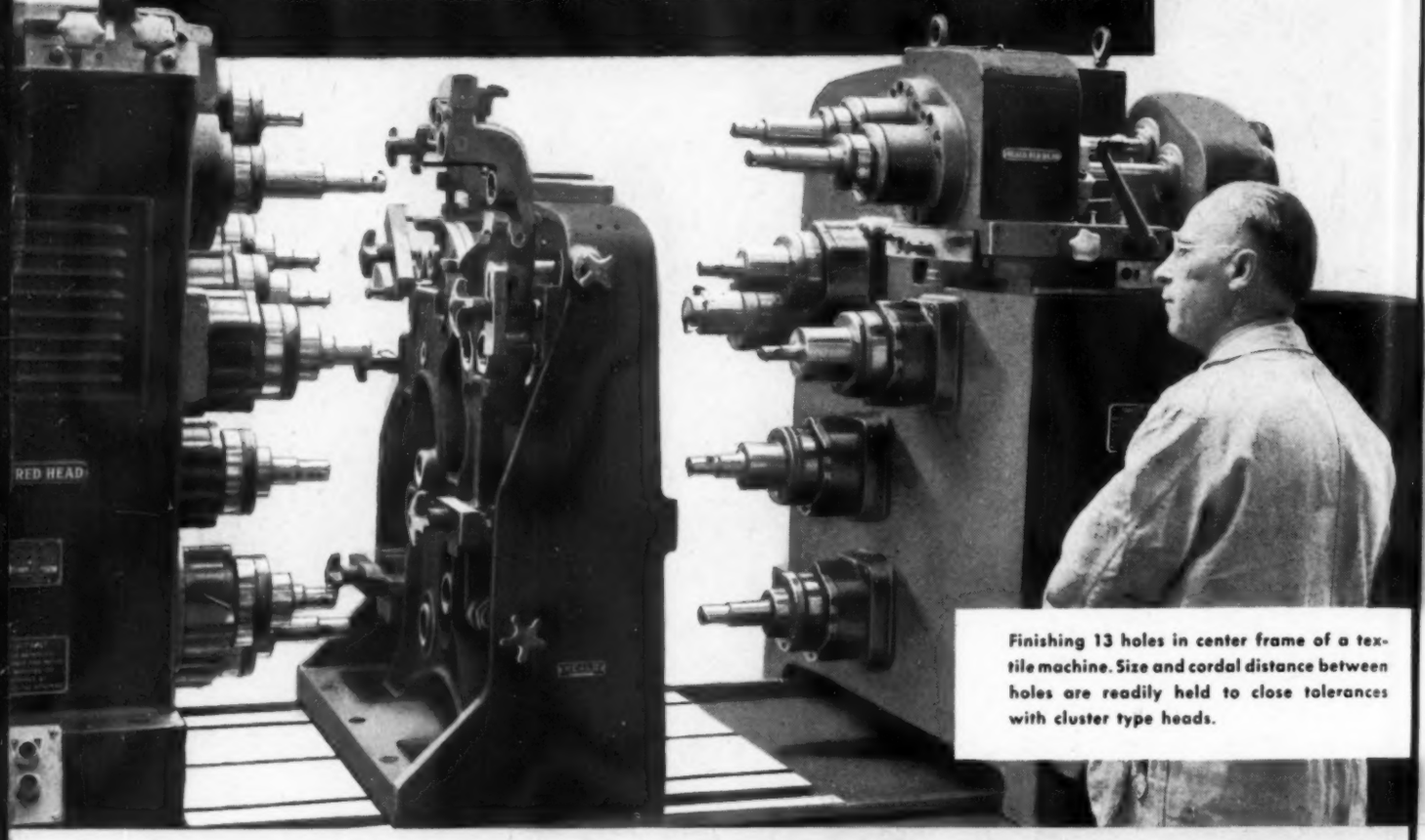
Step-by-Step Induction Hardening

Community Relations Are Important

Machine Tool Show — Preview . . . Act II



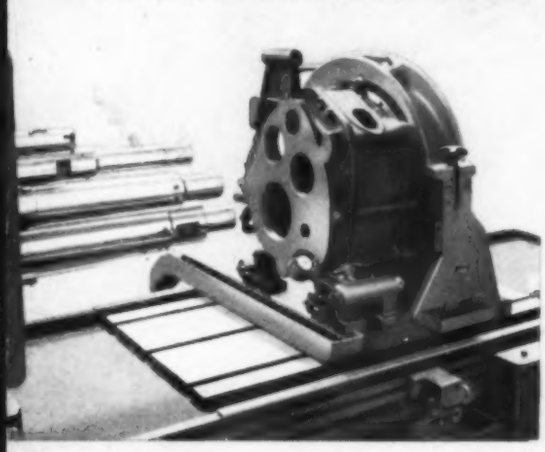
FOR MULTIPLE-BORING OF LARGE, AWKWARD WORK...



Finishing 13 holes in center frame of a textile machine. Size and cordal distance between holes are readily held to close tolerances with cluster type heads.

The Heald No. 45 Bore-Matic is the ideal machine

Boring, chamfering and grooving multiple holes in a transmission case assembly. Note accuracy gauge below work to assist operator.



AVAILABLE EITHER as a single or double-end machine—and with as many as 15 boring heads—the Heald No. 45 Bore-Matic is designed specifically for boring large, hard-to-handle work.

Built low to the floor for the greatest possible convenience in loading, it permits great accuracy in boring heavy cylinder blocks, pump and compressor bodies, large connecting rods, and the like. It can handle parts with holes up to 9" in diameter or with center-to-center distance of finished surfaces up to 33½". Where the part has opposing holes, the double end machine assures extremely accurate alignment.

If you have large, heavy parts tha must be machined to close tolerance be sure to get all the facts on th No. 45 Bore-Matic. Get in touch wit the Heald branch office nearest yo or write: THE HEALD MACHINE COMPAN Worcester 6, Mass.

HEALD

means more precision ... less cost

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INTERNAL AND SURFACE GRINDING MACHINES HEALD BORE-MATIC PRECISION FINISHING MACHINES

TECHNOLOGY DEPARTMENT

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American Machinist

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CONTENTS for August 14, 1947

VOL. 91, NO. 17

ADMINISTRATION

Editorial .....*Burnham Finney* 83
Community Relations Are Important.....*L. J. Fletcher* 89
Excellence or Excuses?.....*Round Table* 105
Our Shop...27.....*O. Fluharty* 122

SPECIAL REPORT

Show Preview—Act II.....*E. J. Tangerman* 85

HEAT TREATING & WELDING

Shop Shots 94
Long Pieces Induction-Hardened Progressively..*Frank W. Curtis* 102

ENGINEERING

Visual Layout Previews Production.....*Harry S. Wharen* 113
How to Apply the Formula for Involute Sliding..*Ben Bloomfield* 121

MATERIAL CUTTING, FORMING

Oil Mist Can Be Eliminated.....*W. F. Herst & H. B. Heyl* 93
Bench Shapers Speed Broaching & Knurling.....*H. L. Flynn* 106
Special Setups Turn Spherical Surfaces.....*C. A. Bloom* 108

TOOLING

Short Cuts .....*A. H. Waychoff* 88
Carbide Dies Cut Laminations.....*Rupert LeGrand* 96
Eccentric Pivot Bars Made In Square-Bored Chuck..*S. Framurz* 123
Carbide End Mills.....*C. W. Pressey* 123
Lathe Controls Spacing.....*J. C. Magee* 124
Lathe Carriage Stop.....*Allan B. Nixon* 124
Lathe Setup Cuts Lugs.....*Donald A. Baker* 125
How to Check Angle Plates.....*Theodore A. Buza* 125
Squaring Rods .....*George E. Jones* 125
Lathe Toolholder Jack.....*M. S. Khaja Hohideen* 126
Collet Adapter .....*C. Clarke* 127
Boring Bar Holder.....*C. W. Lightfoot* 127
Adjustable Height Drill Jig.....*H. Moore* 128
Multiple Toolholder .....*Arnold Dyck* 128

NEWS OF METALWORKING

Spot News 81
Gaging Business 130
Detroit News 133
Washington News 135
Swiss Metalworking 136
Names in the News..... 139

DEPARTMENTS

Tips for Top Shop Men.... 122
Talking Shop 101
Reference Book Sheets..... 143
Shop Equipment News..... 149
Parts and Materials..... 166
Round Table Discussions... 176
New Books 192

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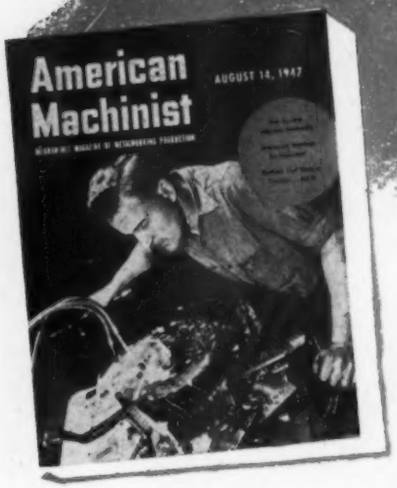


Chips and QUIPS

Progressive Hardening . . . Induction hardening of a wide range of marine herringbone gears is done at Snow-Nabstedt Gear Corp., New Haven, Conn., with the semi-automatic fixture Kodachromed on our cover. The gear shown is of SAE 3460 steel, is 11.888 in. in dia., has 58 teeth, 5/7 pitch, is 5 in. high. Individual tooth sections left- and right-hand, each 2¼ in. long, are heated individually by a single-turn hairpin coil in 14 sec., then indexed at once automatically five teeth into the continuous quench by air cylinder. Hardness of Rockwell C 59-61 is obtained. The gear is mounted by hand on a roller slide so it can be moved into and out of the coil for indexing. Changeover for gear size takes 5 min., requiring only a different locating plug and adjusting indexing-arm stroke. The induction heater is a 20-kw. Thermonic high-frequency electronic oscillator, and the photo, taken by Sid Karson of McGraw-Hill Studios, is another type of the progressive-hardening fixtures described by Frank Curtis in this issue.

Control Again. . . Visual plant layouts help determine space, man and machine utilization for Ford. Associate Editor Wharen explains how.

Trouble . . . Among tribulations of our editors calling on machine-tool builders for advance dope on Show exhibits are these extracts of a report from Ricker: "Got into Cleveland last night after driving through the worst storm . . . in years . . . To cap the climax, someone tried to break into my car while I was registering at the hotel. They smashed a window and stole the keys . . . Fortunately I had a spare set in my pocket so I drove to a garage."

Involutes Submit . . . Ben Bloomfield, who presented his formula for involute sliding six months ago, now comes back with applications of it, in response to reader questions. We like to provide such answers—the longest answer on record being that 12-page special report on Brinell hardness in July 17 *A.M.* This one is considerably shorter.

Polystyrene Parts . . . Tooling is all over this issue. Tooling for production of tricky long plastic parts is described by W. F. Poupard, Nash-Kelvinator staff engineer. Chester Ricker, our Detroit man who doubles as an official for the Indianapolis Speedway race, picked up the story and added sketches while he awaited the annual 500-mile grind. Control of heat and amount of plastic compound put in—these are the keys to success.

Carbide "Scoops" . . . Associate Editor LeGrand, nosing around Detroit in late June, uncovered three new and useful stories on carbide dies, two still warm from the pen of Earle Glen of Carboloy (July 17 and 31 *A.M.*) and his own in this issue on progressive and compound sheet-metal dies which are more than paying their way. They're worthy—and exclusive—lowdown for your "how to tool" file . . . More tooling is presented in uses of bench shapers for broaching and knurling.

Ball and Socket . . . C. A. Bloom, chief tool engineer at Dodge Mfg. Corp., gives data on a wide variety of methods he's developed for turning concave and convex surfaces on a production basis. It's a specialized job—but one any shop man should know how to handle.

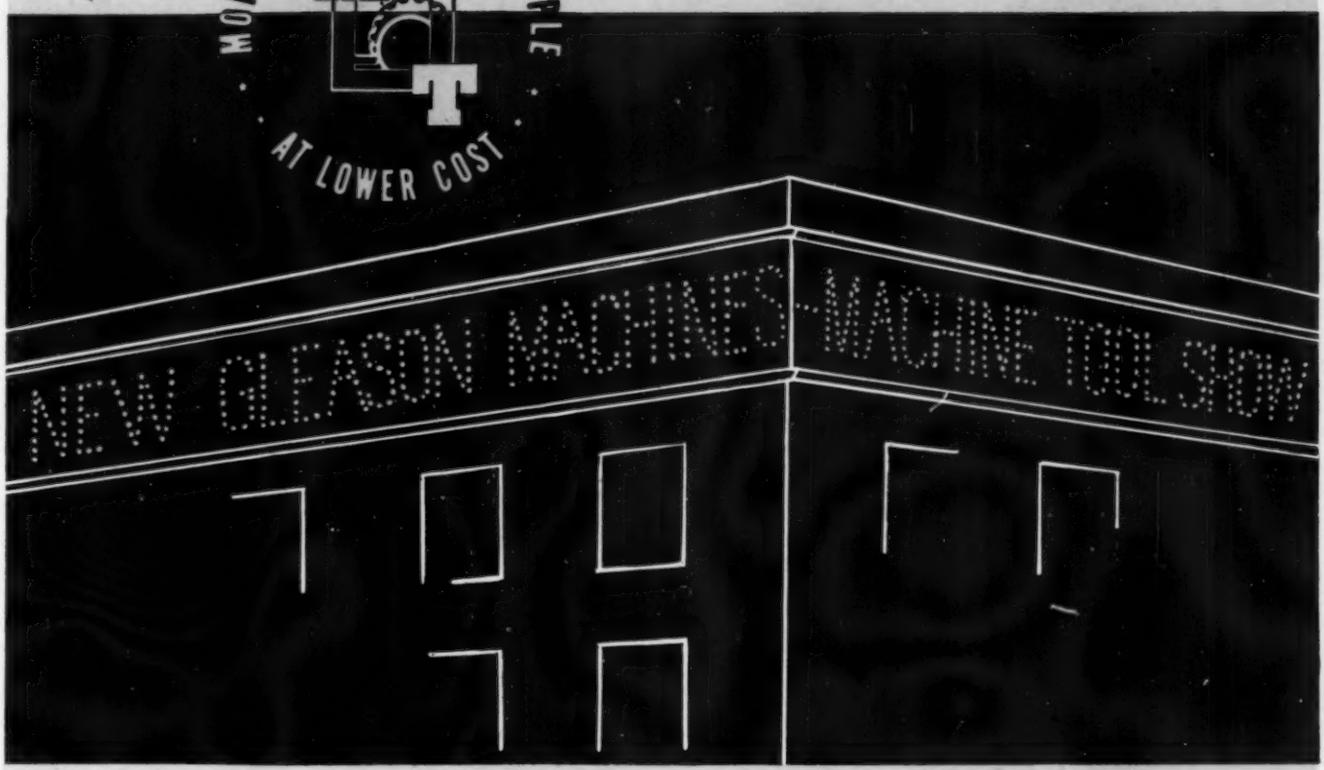
Coming . . . How Crosley brazes its engine, with sketches by Ricker, and a 20-page special report on Tool Grinding, will be features of Aug 28 *A.M.* The special report will be done in pictures and "how to" captions—quite a job to produce. Then there'll be a very different sort of special report—a guide to eating places while you're in Chicago. Other practical articles will discuss spotwelding of Kaiser-Frazer bodies, use of air presses at Arrow, Hart & Hegeman in Hartford, Conn., unit loads as a protection for parts, modern methods for testing springs, and how Stewart Warner handles replacement.

COMMUNITY AIDE . . . Born May 1, 1891, at Chadron, Neb., of pioneer Scotch-Swedish stock, L. J. Fletcher was reared on a dairy farm in Iowa. He received his B.S. in Agricultural Engrg. from Iowa State in 1915, thereafter taught that subject for 12 years at Washington State and U. of Calif., latterly being head of his division.

Jan. 1, 1827, he took charge of Caterpillar Tractor Co. agricultural sales. Most of 1929 and 1933 he spent in the U.S.S.R., developing trianing schools, repair shops, etc. In 1937, he was appointed asst. gen. sales mgr. for "Cat", and in 1941 director of training. Community Relations came under his direction in 1944, the same year in which he was awarded the McCormick Medal. He is a past president of the Amer. Society of Agricultural Engrs., active in the ASME, ASTE, ASEE, state and national Chambers of Commerce and a number of local philanthropic and municipal organizations. He describes Caterpillar's community relations in this issue.

THE NEWS IS OUT!

MORE GOODS FOR MORE PEOPLE AT LOWER COST



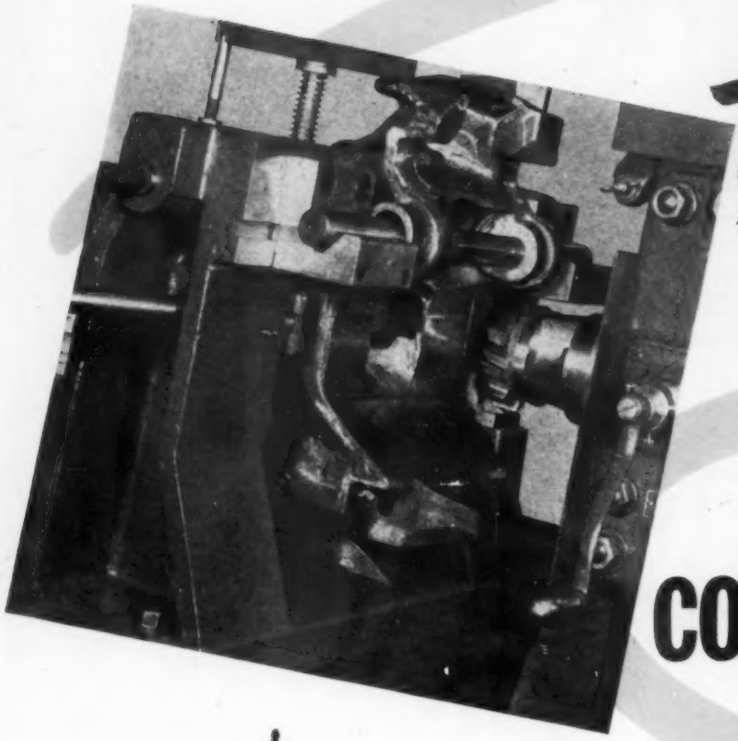
BOOTH 330

The many months of preparation to produce startling new units of Gleason equipment will culminate at the Machine Tool Show in Chicago. In addition to automatic bevel gear cutting machines capable of faster production and greater accuracy . . . cutting to finer tolerances than heretofore possible, will be cutter sharpeners and bevel gear testers illustrating conclusively the need for a complete unit of equipment for efficient uninterrupted production . . . a means of producing more goods for more people at lower cost.

GLEASON Works
1000 University Avenue
Rochester 3, N.Y., U.S.A.

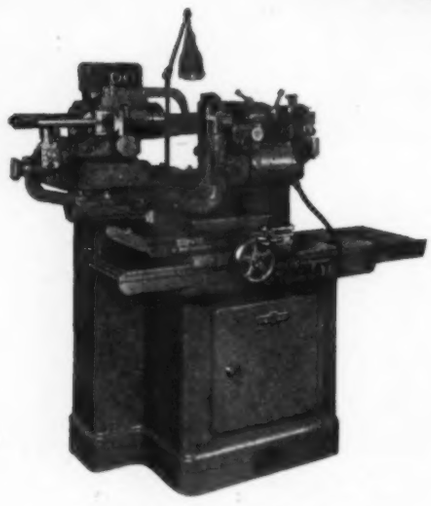
Builders of Bevel Gear Machinery for Over Eighty Years

Form cutters for milling operations like

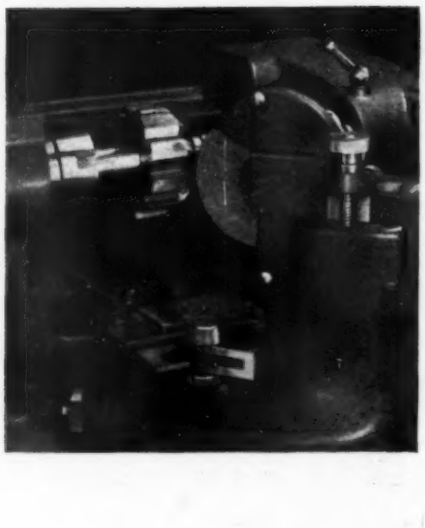


THIS and THIS

ground on the CONTOUR CUTTER



CINCINNATI Contour Cutter Sharpening Machine. Complete details may be obtained by writing for catalog M-1552.

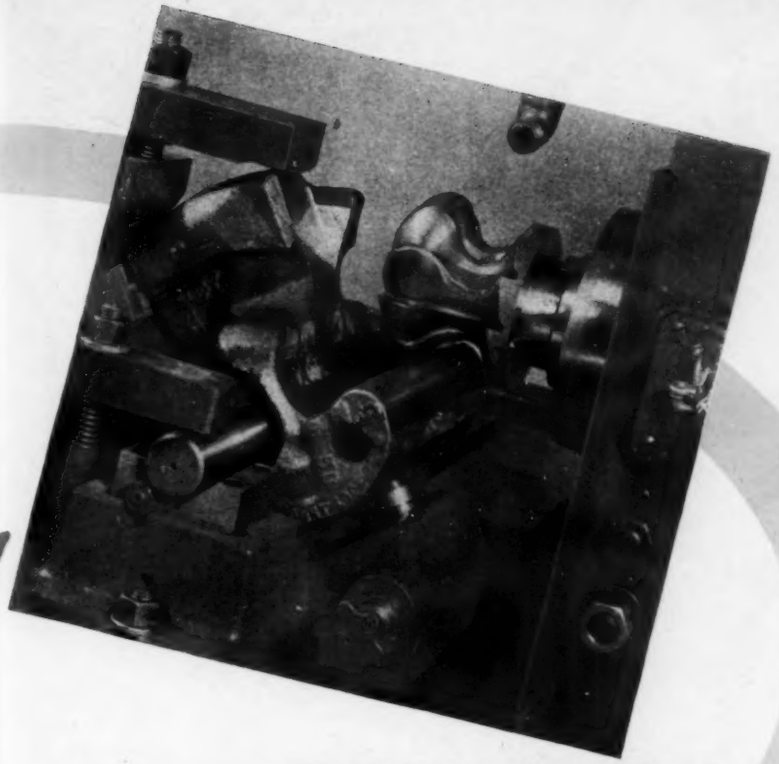


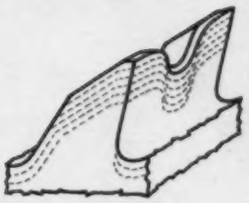
Above, left and right Milling operations on railroad car couplings with profile type form milling cutters sharpened on CINCINNATI Contour Cutter Sharpening Machines

Left. Sharpening the form cutter used in the milling operation at the left (above) on a CINCINNATI Contour Cutter Sharpening Machine.

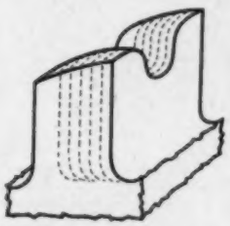
THE CINCINNATI MILLING

MILLING MACHINES





CONTOUR GROUND—Desired profile of tooth occurs at cutting edge only. Proper peripheral and side clearance and adequate chip space easily maintained



CAM RELIEVED—Desired profile must be carried back into tooth. Impossible to use adequate clearance angles. Especially side clearance.

These two sketches illustrate the basic difference in tooth structure between form relieved and contour ground cutters.

new CINCINNATI SHARPENING MACHINE

There's only one reason for sharpening milling cutters or any other cutter . . . to perform useful work. The two examples shown here are performing very useful work; they're milling railroad car couplings. But these are not ordinary form cutters, nor are they sharpened in the conventional manner; they're contour ground cutters, sharpened on a CINCINNATI Contour Cutter Sharpening Machine. ¶Form milling with profile type milling cutters offers attractive cost-reducing possibilities, and quite often, simplification of design. The efficient and effective way to sharpen cutters of this type is on the new CINCINNATI Contour Cutter Sharpening Machine. Write for catalog M-1552. It contains machine specifications, and explains the advantages of contour ground cutters.

See the
CINCINNATI MILLING DISPLAY
at the MACHINE TOOL SHOW,
Booth No. 306
Chicago, Sept. 17-26

MACHINE CO. CINCINNATI 9, OHIO, U. S. A.

BROACHING MACHINES • CUTTER SHARPENING MACHINES

Small Gears

Magazine Feed, Affords Continuous Cutting

Gear Shaper Precision

See it

AT THE

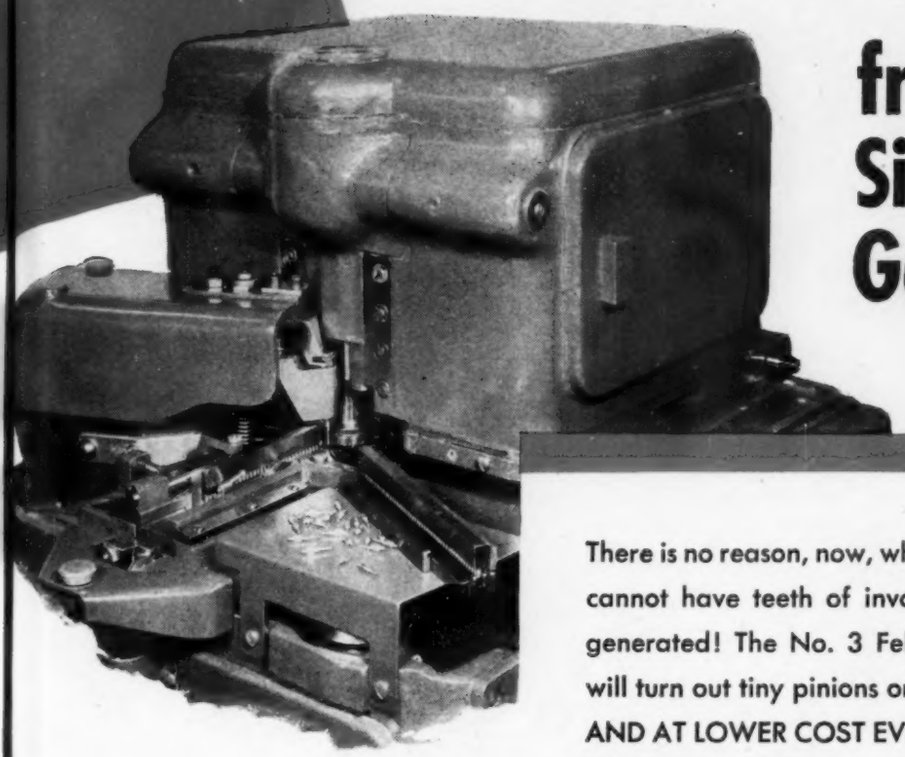
MACHINE TOOL SHOW

CHICAGO

SEPT. 17 to 26

..Thousands per day!

from a Single Gear Shaper



This magazine feed, rugged and reliable, on a No. 3 Fellows Fine-pitch Gear Shaper produces 600 per hour of the small pinions shown here.

There is no reason, now, why fine-pitch gears and pinions cannot have teeth of involute shape and be precision generated! The No. 3 Fellows Fine-pitch Gear Shaper will turn out tiny pinions or gears at phenomenal speeds AND AT LOWER COST EVEN THAN SUB-PRESS STAMPINGS. Obviously, accuracy and tooth-surface finish are of a substantially high order. Isn't it something to find out about? Write for literature. The Fellows Gear Shaper Company, Head Office and Export Department: Springfield, Vermont, Branch Offices: 616 Fisher Bldg., Detroit 2 ... or 640 West Town Office Bldg., Chicago 12.

Fellows

THE FELLOWS METHOD... MACHINES AND TOOLS FOR ALL OPERATIONS FROM BLANK TO FINISHED GEAR

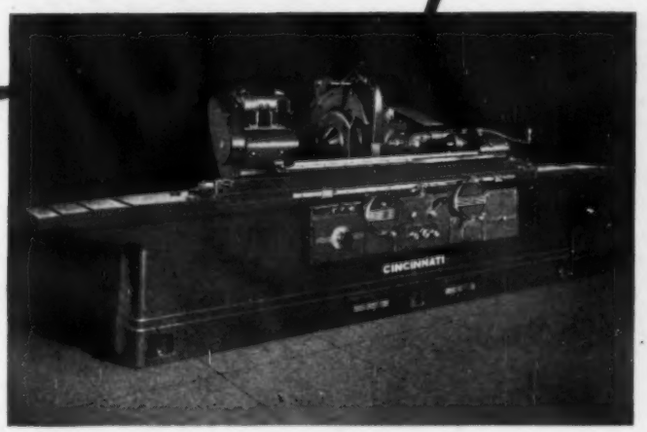
See the
CINCINNATI GRINDERS DISPLAY
at the MACHINE TOOL SHOW,
Booth No. 306
Chicago, Sept. 17-26

Grinding milling machine arbors, after the keywaying operation. The machine is a CINCINNATI FILMATIC 10" Plain Hydraulic.

CINCINNATI GRINDERS

CENTER TYPE GRINDING MACHINES

You can assign *the tough jobs* to CINCINNATI FILMATIC GRINDERS



CINCINNATI FILMATIC 10" Plain Hydraulic Grinding Machine, catalog G-490-2. Also available in 14" L size, catalog G-533-1. Between-center lengths 18", 36", 48" and 96".

An intermittent diameter is not the easiest job in the world to grind, especially when the parts are slender. It takes a good man, *and* a good machine. Here's a helpful tip in grinding work of this type. Cut a number of rectangular wood strips of a size to fit tightly into the keyway. The length should exceed the width of shoe on the backrest. Drive the wood filler into the keyway at each backrest contact. Use a fairly hard wood, such as maple. This precaution will greatly aid in sizing the work; it will prevent the backrest shoes from being "chewed up." And here's another helpful tip . . . grind jobs of this type on CINCINNATI FILMATIC Grinders. These machines have many features of value in precision grinding any type of work within their range: FILMATIC grinding wheel spindle bearings; smooth gearless headstock drive with infinitely variable speeds over 4 to 1 ratio; infinitely variable table traverse rates 3" to 220" per minute; headstock rotation and coolant flow automatically start and stop with the table traverse, and many other features which contribute to low-cost precision grinding. You may obtain complete data by writing for publication G-490-2.

CINCINNATI

INCORPORATED CINCINNATI 9, OHIO, U. S. A.

CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES

Van Norman

RAM TYPE MILLING MACHINES

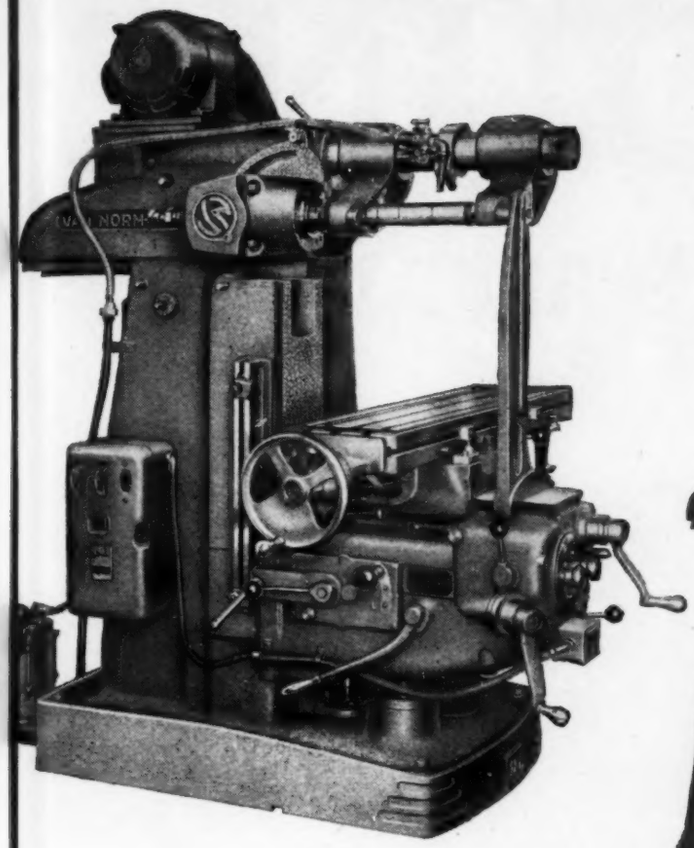
Handle Most Milling Jobs without Attachments

Do your milling requirements vary from job to job, day to day? Van Norman Ram Type Millers will solve your problem by permitting you to perform conventional horizontal or vertical as well as angular milling *all* on *one* machine. All you have to do is swivel the adjustable cutterhead to the required type of milling, set up the work and you're set to do the job.

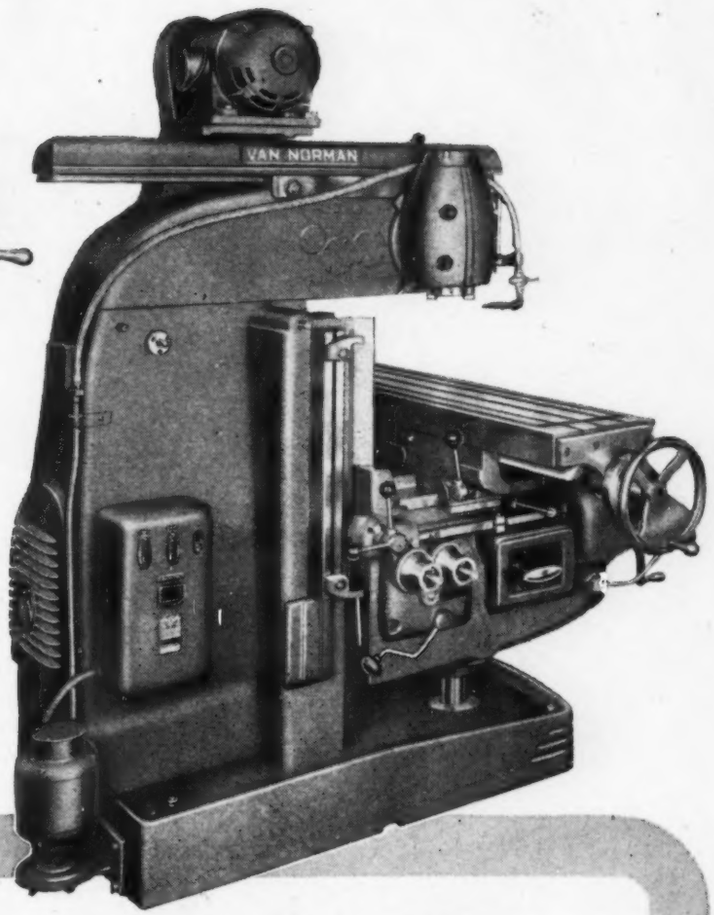
In addition, these versatile millers save you time and increase production by minimizing work reset-up because you swivel the cutterhead instead of changing the set-up.

Van Norman Ram Type Millers enable you to meet all milling jobs and cut costs in the tool room, machine shop, experimental laboratory, tool and die shop and pattern shop. They are available in 16 models. Write for complete details and catalogue describing these machines today.

"IT PAYS TO VAN NORMANIZE"



No. 22L
Head Horizontal



No. 26
Head Vertical

VAN NORMAN RAM TYPE MILLERS

No. 36	Table:	58 x 13 in.	No. 22M	Table:	50 x 10 in.
No. 26	Table:	50 x 12 in.	No. 12	Table:	32½ x 9 3/16 in.
No. 22L	Table:	45 x 10 in.	No. 6	Table:	26¾ x 6⅞ in.

Van Norman Ram Type Models are made with plain or universal saddles.

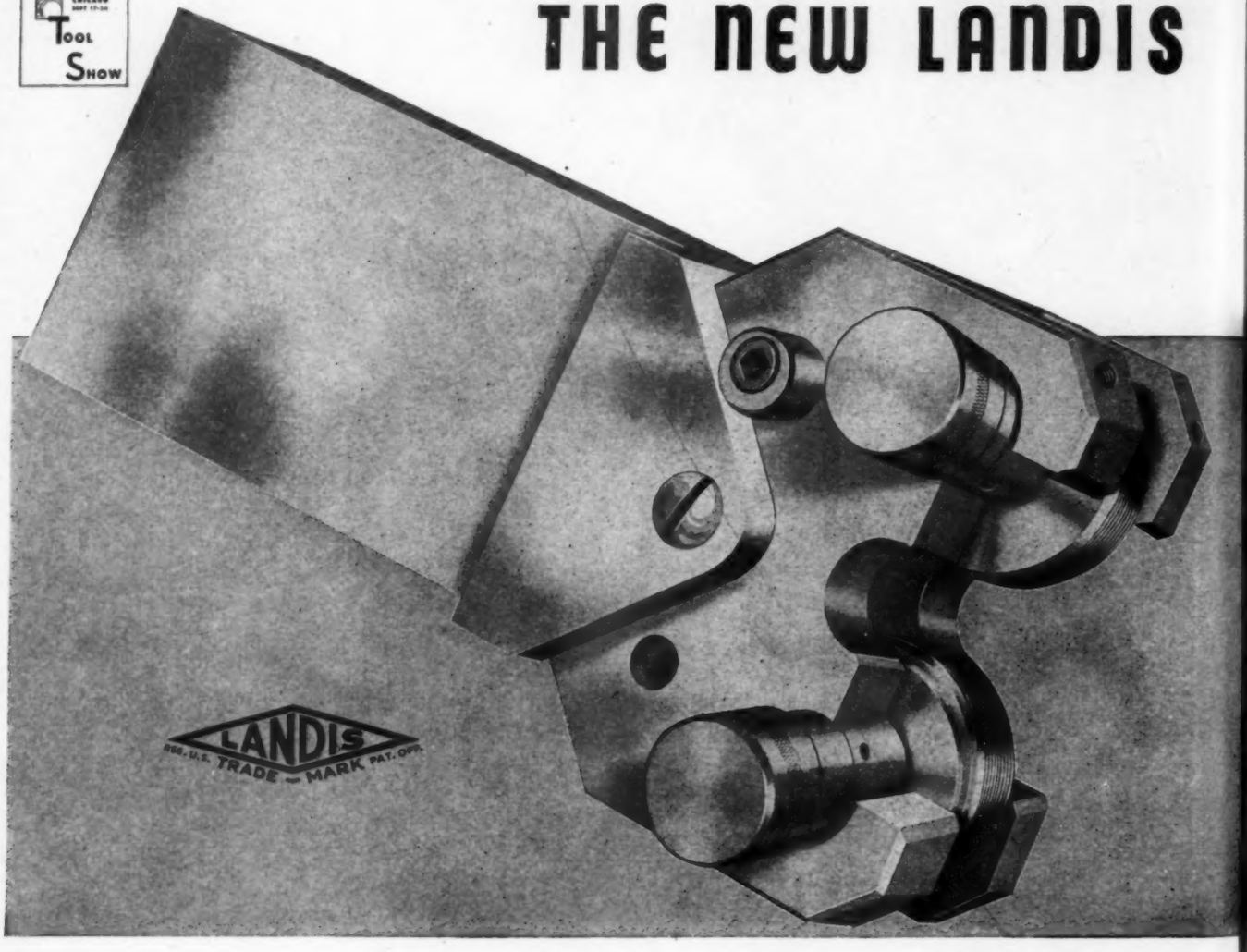
These millers come in numerous special models which have a higher column providing greater distance between center of spindle and top of table. The machines are especially useful in applications encountered in pattern and die work which require a greater vertical range than available in standard models.

VAN NORMAN COMPANY
SPRINGFIELD 7, MASSACHUSETTS

ANNOUNC

1947 Machine Tool Show, Chicago

THE NEW LANDIS



LANDIS MACHINE *Company*

WAYNESBORO, PA.

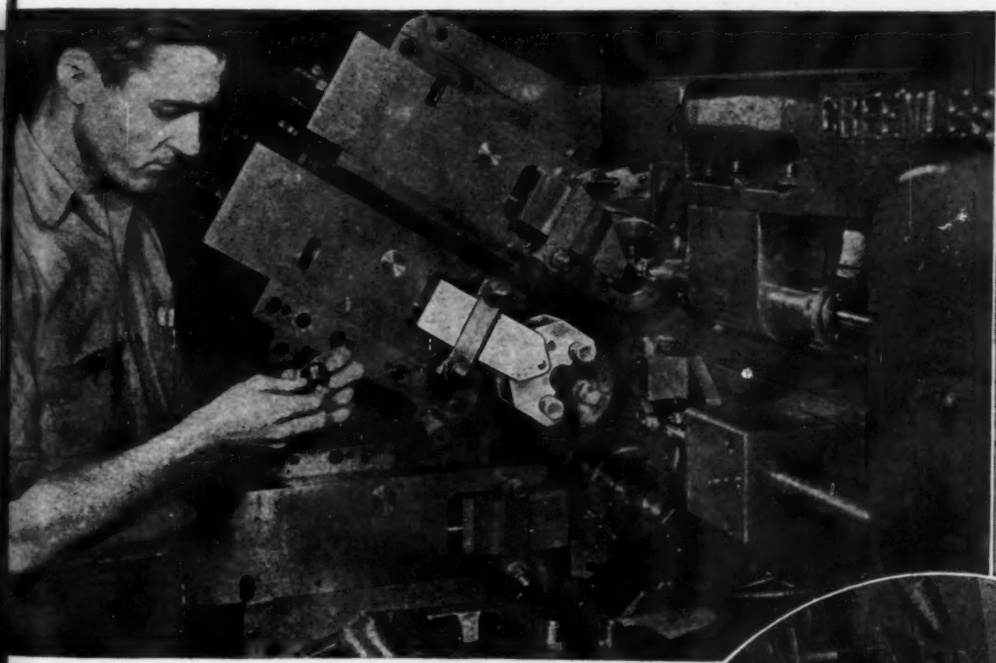
Thread rolling is a fast and economical method of generating screw threads. Inaccessible positions for normal die head threading or shoulder interference ordinarily would require processing these threads as a secondary operation. The LANROLL Attachment allows the work to be completed in the same chucking. This provides closer tolerance between the thread and other sections of the work piece. Generally the thread rolling operation can be performed at the same work speeds as other machining operations, and this contributes even further to cost reduction. Since the thread rolling attachment is primarily a single purpose tool for use on Automatic Screw Machines it must be designed for one particular machine, and one particular diameter, pitch, form and length of thread.

ING

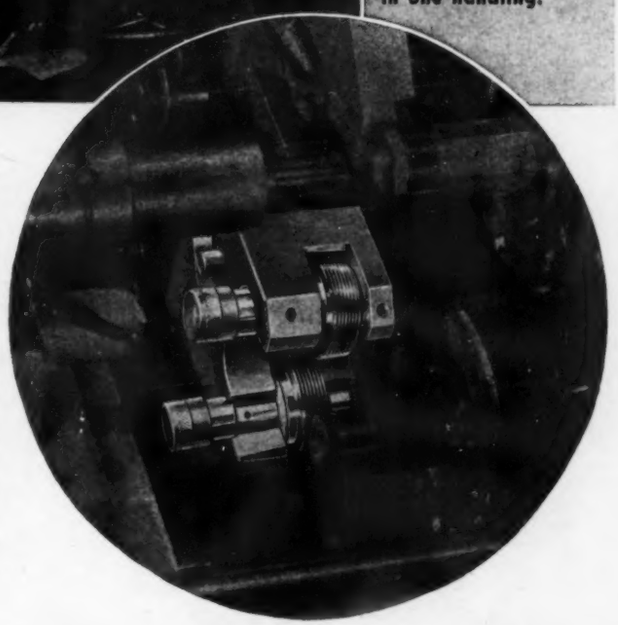
Lanroll ATTACHMENT

FOR ROLLING STRAIGHT THREADS

This newest development, designed for Automatic Screw Machines and Turret Lathes, further enlarges the Landis Line of equipment for all types of threading jobs---thread cutting, thread grinding, and thread rolling.



The No. 18 Lanroll Attachment illustrated is being used on an Automatic Screw Machine to roll threads on Steel Bushings. The use of the Lanroll Attachment eliminates producing the thread as a separate operation. The thread is rolled as it is formed —thus, the bushing is completely machined in one handling.



The LANROLL Attachment offers considerable advantages over the type commonly used in the past on automatic machines. By employing the largest diameter rolls permissible, The LANROLL Attachment provides the most efficient rolling action. By employing a set of two rolls, The LANROLL Attachment effects a reduction in feed load. While feed load increases with a single-roll application as penetration progresses, with a two-roll application feed load decreases. Thus smaller diameters can be rolled, and in positions somewhat extended from the work-holding chuck support. The thread length which can be rolled with The Standard LANROLL Attachment is limited to one and one-half times the thread diameter or less.

NEW VISUAL-AUTOMATIC SIZING

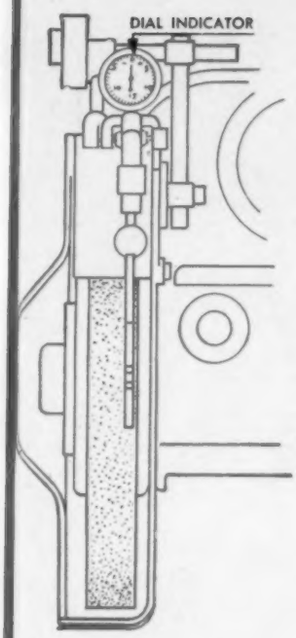
a LANDIS TOOL development for high production with high precision

EQUIPPED WITH MICROSPHERE BEARINGS

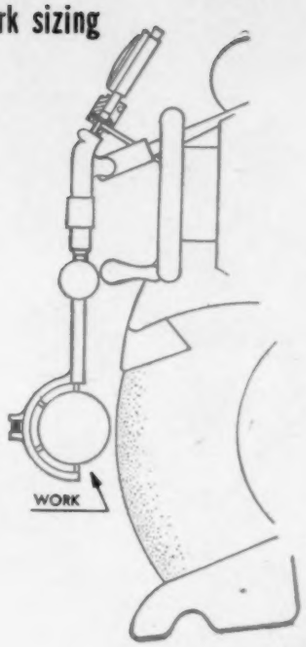
LANDIS TOOL

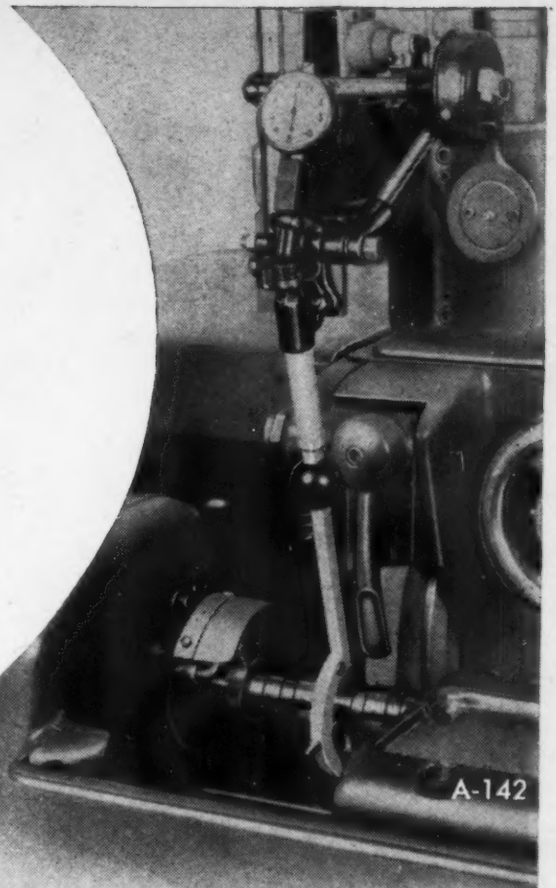
Precision Grinders

69



work sizing

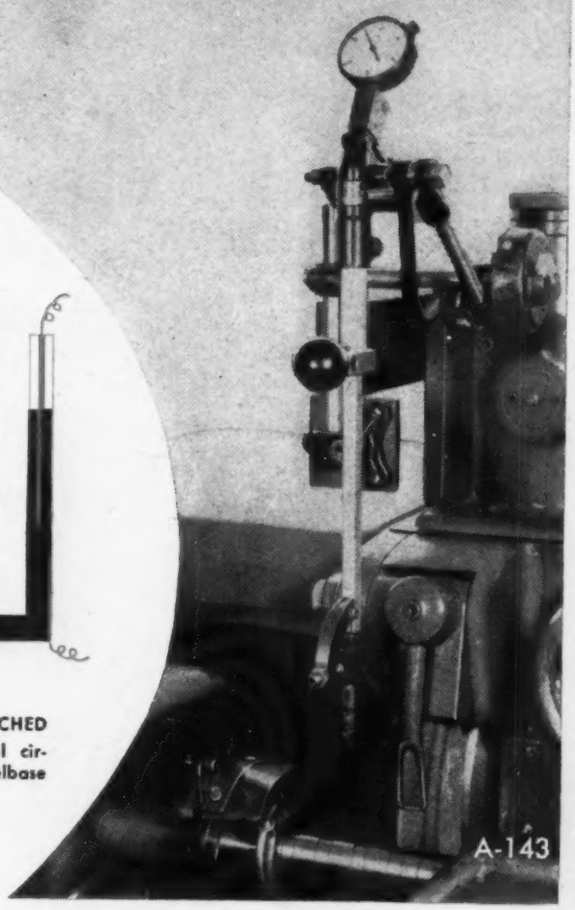




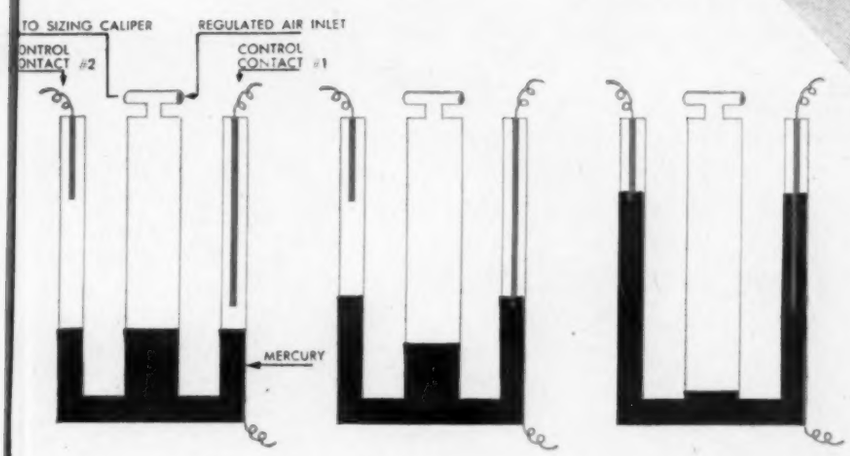
grinding position

HOW VISUAL AUTOMATIC SIZING WORKS

load and unload position



sizing control cycle

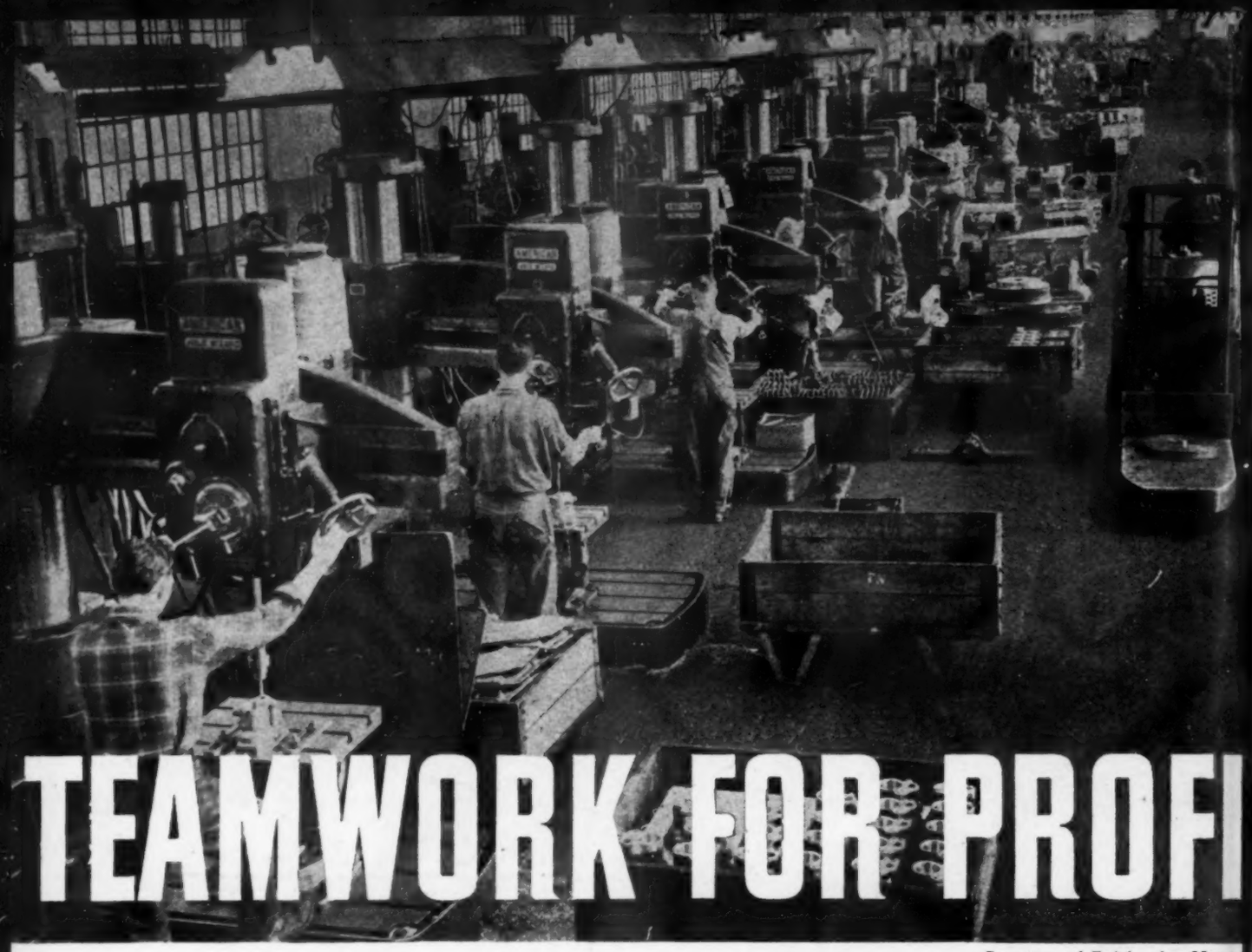


START OF GRIND
—Control circuits open.

APPROACHING SIZE
—First control circuit closes; Stops slow feed, starts fine feed.

FINAL SIZE REACHED
—Second control circuit closes. Wheelbase retracts.

LANDIS TOOL COMPANY / WAYNESBORO, PENNA.



TEAMWORK FOR PROFI

Courtesy of Fairbanks, Morse

Quality Tools produce a Quality Produc

Fairbanks, Morse & Co., one of the world's leading manufacturers of Electrical Equipment and Diesel Engines, uses scores of "American" Hole Wizard Radial Drills to produce quality at a profit.

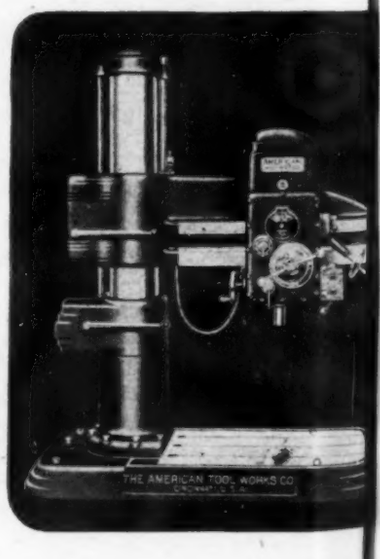
The smooth operation and easy handling of "American" Radials give them front rank recognition amongst users as dependable producers of accurate and finely finished work.

The directly connected, head mounted motor guarantees maximum power at the spindle.

Finger-tip and direct-reading controls insure speedy manipulation for greater work production.

Anti-friction mounting of head on arm and convenient location of all operating levers mean less operator fatigue and more work at day's end.

For quality work at a profit your best bet is "AMERICAN".



THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio, U. S. A.

Lathes and Radial Drills

Attend the Production and Machine Tool Show
International Amphitheatre, Chicago, Sept. 17 - 26

Write for insert No. 90 illustrating and describing in detail the World's Most Complete Drill Press Line — the Canedy-Otto line.

THIS *Free* CATALOG TELLS YOU HOW TO

GET *MORE* FROM YOUR DRILL PRESS DOLLAR!

Today, your drill press dollar can buy MORE — more production, more service, more speed, more economy, greater ease of operation. Since 1892 we have concentrated on one task — building better drill presses. Today each Canedy-Otto Drill Press has a solid background of 55 years experience gained in close cooperation with the metal working industry. Write today for insert No. 90, describing and illustrating the World's Most Complete Drill Press Line. No other manufacturer offers as complete a line, none offers greater value. Before you invest, investigate the Canedy-Otto line.

CANEDY-OTTO MFG. COMPANY
CHICAGO HEIGHTS, ILLINOIS

Please send Insert No. 90 covering the complete Canedy-Otto line.

NAME .....

COMPANY .....

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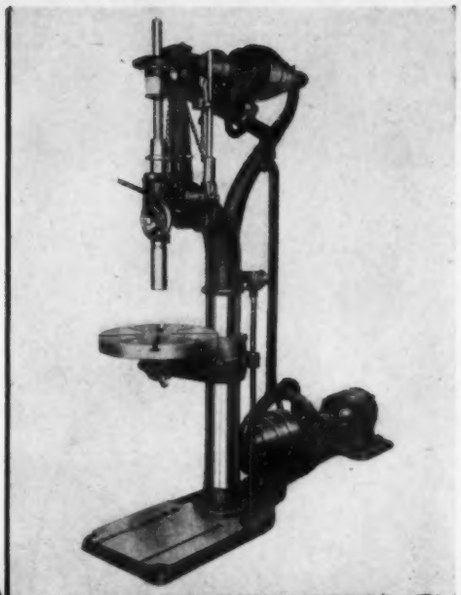
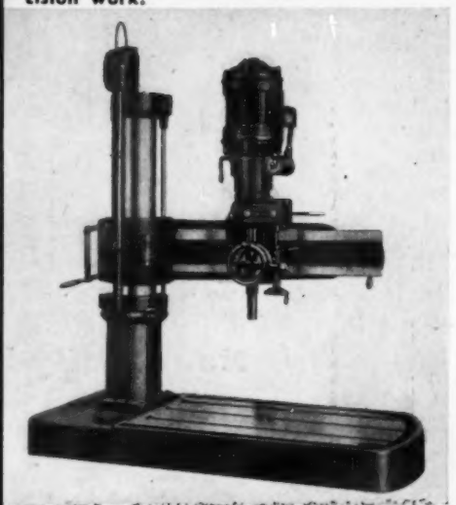
CANEDY-OTTO

C THE WORLD OVER O



8 SPEED — 21" STATIONARY HEAD FLOOR DRILL

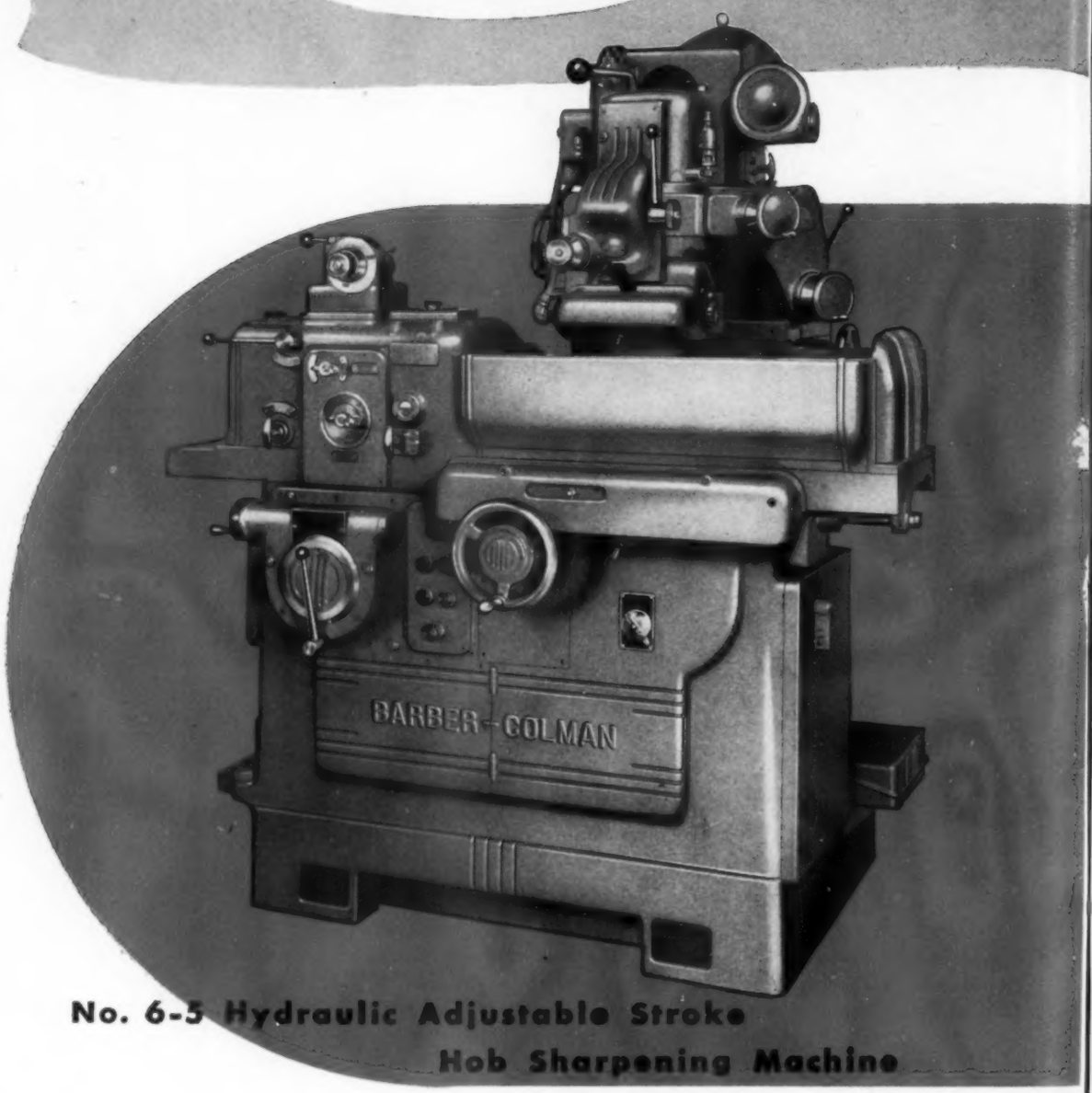
An ideal general purpose drill, equipped with back gears and power feed, ratchet type lever feed, wheel feed and automatic stop. 8 Spindle speeds and 3 rates of power feed. Available with either tight or loose pulley drive for counter-shaft power take-off, or electric Vee belt, or geared motor drive. Rugged one-piece semi-cast steel construction. Accurately machined table and base. Table pivots, swings 360° around column. Capable of close precision work.



8-12 SPEED MOTOR SPINDLE RADIAL DRILL

1-¾" capacity, with 3 ft., 4 ft. and 5 ft. arm, 9" and 11" column. Simply designed, easy to operate, capable of closest precision work. Powered by 2 H.P. constant horsepower motor, magnetically controlled, available in two types — 1200 R.P.M. and 1800 R.P.M. Four rates of power feed. Provides an efficient and convenient method of tapping. Equipped with automatic trip for predetermined depth drilling. Has coolant pump mounted directly onto tank of base. Combines all the best features of many larger, more expensive radial drills.

ANNOUNCING A new BARBER-COLMAN



No. 6-5 Hydraulic Adjustable Stroke Hob Sharpening Machine

for • IMPROVED ACCURACY • CARBIDE SHARPENING • FINER FINISH

featuring • VARIABLE STROKE • HYDRAULIC CYCLING • AUTOMATIC OPERATION

to eliminate • WORK INSPECTION ON THE JOB • REGRINDING FOR CORRECTIONS

A completely new machine from the bed casting up, with automatic hydraulic stroke, the No. 6-5 has been designed to meet the need for faster sharpening, micro-finish on carbide tools, wet or dry grinding, and a degree of accuracy and finish never before attained by commercial face sharpening equipment. This machine will be demonstrated at the Machine Tool Show and complete information and operating features will be made available at that time. This announcement is made in advance, to assist you in scheduling visitations for all interested shop personnel. Don't fail to see this machine.

AUTOMATIC HOB SHARPENING MACHINE

PRE-SHOW *Announcement*

With the introduction of new machines into our line, all Barber-Colman Machine Tools will be designated by numbers referring to rated capacities for diameter and face length. These designations are the result of requests by our customers for a system of rapid identification. Designations will be as follows:

sharpening

NO. 4-4	Mechanical Fixed Stroke Automatic Hob Sharpening Machine — 4" diameter x 4" face. (Former 3HS).
NO. 6-5	Hydraulic Adjustable Stroke Automatic Hob Sharpening Machine — 6" diameter x 5" face. (Supplements our former line).
NO. 10-12	Hydraulic Adjustable Stroke Automatic Hob Sharpening Machine — 10" daimeter x 12" face. (Former 4HS).
NO. HRS	Hob and Reamer Sharpening Machine.

hobbing

NO. 1-½	Fine Pitch Precision Spur Gear Production Hobbing Machine — 1" diameter x ½" face. (Former Type S).
NO. 6-10	General Purpose Horizontal Hobbing Machine — 6" diameter x 10" face. (Former 3HM).
NO. 8-10	Vertical Cycling Production Hobbing Machine — 8" diameter x 10" face. (Former Type V).
NO. 8-12	Horizontal Cycling Production Hobbing Machine — 8" diameter x 10" face. (Supplements our former line).
NO. 14-15	Horizontal Cycling Production Hobbing Machine — 14" diameter x 15" face. (Former Type D).
NO. 16-11	Taper Spline and General Purpose Hobbing Machine — 16" diameter x 11" face. (Former Type T).
NO. 16-16	Horizontal General Purpose Hobbing Machine — 16" diameter x 16" face. (Former Type A).

NOTE: — Figures shown refer to maximum distance between centerline of the hob spindle and the overarm, and the maximum travel of the hob slide. Actual capacity will depend on pitch, material, diameter, etc.

In connection with these new machine designations, many production advantages and mechanical improvements have been included. A complete staff of Hobbing experts will be on hand in our booth to demonstrate all of these details See these new machines at the Machine Tool Show, September 17-26.

BARBER B-C COLMAN

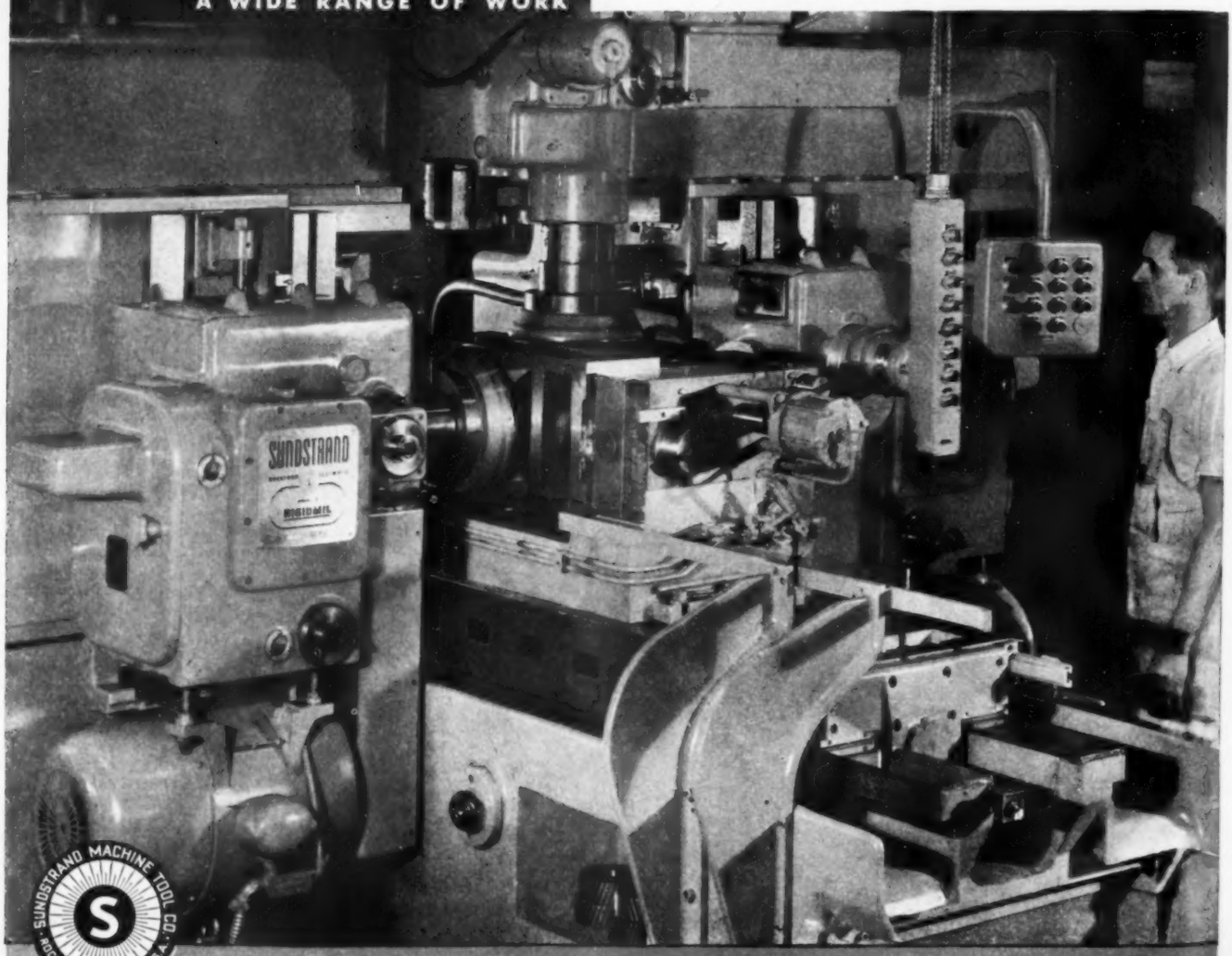
Barber-Colman Company

GENERAL OFFICES AND PLANT 111 LOOMIS ST., ROCKFORD, ILLINOIS, U.S.A.

Here's the New SUNDSTRAND Triplex Rigidmil

FOR CARBIDE MILLING AT EXTREME ACCURACIES OVER A WIDE RANGE OF WORK

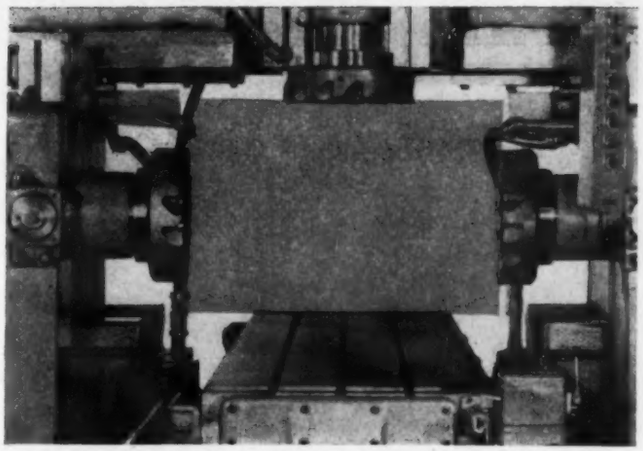
Here's flexibility in a production type Rigidmil, flexibility to accomodate both wide and narrow parts. Further, the basic design of this machine allows this extreme flexibility without sacrifice in accuracy. Three 25 horsepower spindle heads, one vertical, two horizontal, can be adjusted to mill three sides of a part simultaneaously. Since the vertical spindle is offset, three sides can be milled with absolutely square corners using conventional face milling cutters. Individually motor driven heads permit the use of one, two or all three heads while milling. Extra rigidity and built-in accuracy makes it possible to take split cuts, with successive table passes with any spindle



SUNDSTRAND MACHINE TOOL CO. · ROCKFORD, ILLINOIS, U.S.A.

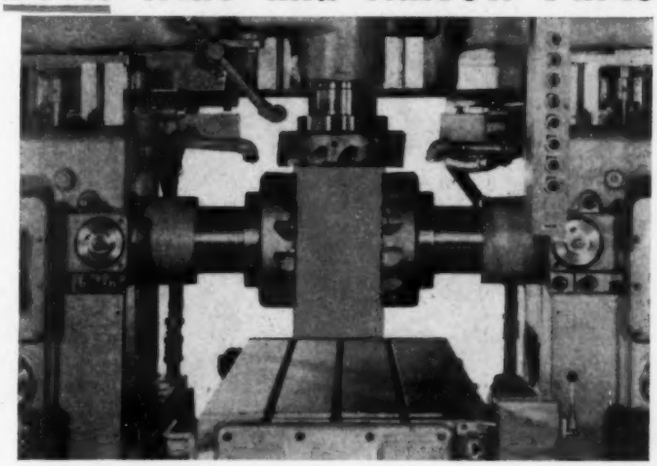
RIGIDMILS • FLUID SCREW RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT

and maintain extreme accuracy and flatness. Ample horsepower permits carbide milling. The vertical spindle head is mounted on vertical ways, has power movement and power clamping. It is carried on a crossrail which has power movement and power clamping for positioning the vertical spindle crosswise to the machine table. All three spindles have micrometer quill adjustment for extremely accurate setting.



Handles BOTH Wide and Narrow Parts

The illustrations to the right indicate the wide range of workpieces which can be accommodated on the Sundstrand Triplex Rigidmil. This versatility is provided through spindle and crossrail adjustments.



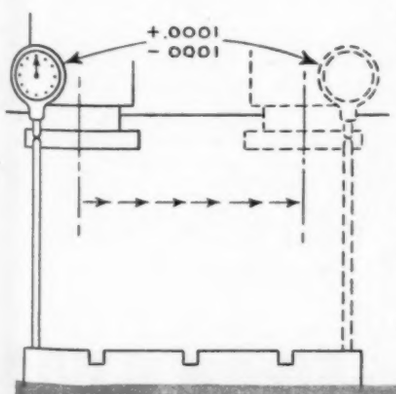
Above — Maximum workpiece accommodated on the Triplex
Below — Minimum workpiece accommodated on the Triplex

Three 25 H.P. Heads for Carbide Milling

A total of 75 horsepower can be put through this machine with three heads working simultaneously.

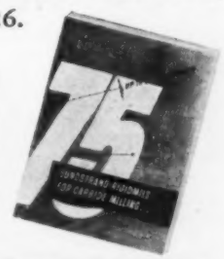
Built-in Accuracy Assures More Accurate Milling

Note the drawing shown below. This accuracy is possible because of the unique design of the cross rail. This heavy part is designed to rest flat on its ways and consequently cannot shift or move during machining. Micrometer adjustment insures accurate positioning of the spindles.



See this and Other Sundstrand Machines in Action in Booth No. 20 at the machine tool show, Dodge Plant, Chicago, Sept. 17–26.

FREE ADDITIONAL DATA is included in this new bulletin covering details and specifications of this new outstanding machine. Write for your copy today. Ask for bulletin No. 163.

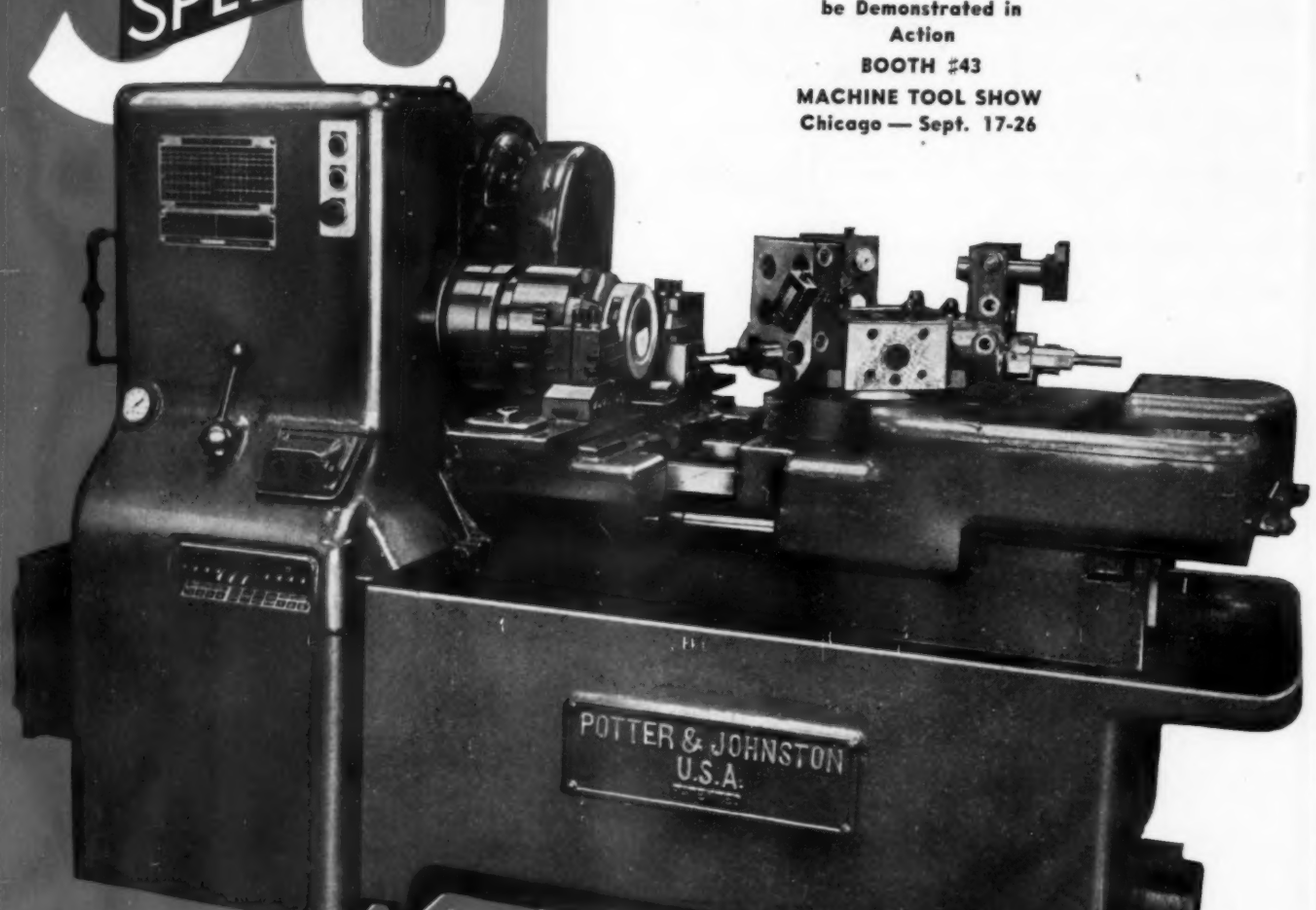


SUNDSTRAND MACHINE TOOL COMPANY
2533 Eleventh St. • Rockford, Ill., U.S.A.

DRILLING AND CENTERING MACHINES • SPECIAL MILLING AND TURNING MACHINES

3U SPEED-FLEX . . . THE NEWEST, FASTEST AU

P. & J. Automatics will be Demonstrated in Action
BOOTH #43
MACHINE TOOL SHOW
Chicago — Sept. 17-26



Left: Comparative view of the new 3U SPEED-FLEX Automatic Turret Lathe and the P & J 9D Machine—the largest and the smallest in the complete line of P & J machines—12 models with 4, 5 or 6 turret faces.

FLOOR SPACE:
16 SQUARE FEET

POTTER & JOHNSTON
PAWTUCKET

ST AUTOMATIC TURRET LATHE

The 3U SPEED-FLEX opens up new fields for economical automatic production . . . makes high output possible on an entirely new range of work . . . reduces labor and handling costs on parts up to 6" in diameter, 4" long. Spindle speeds up to 1445 R.P.M., ample power, and the well-known P & J rigid design enable full use to be made of tungsten carbide tools. Hand pick-off gears provide four automatic changes of speed and three automatic changes of feed. All changes are made by electro-pneumatic control of multiple disc clutches actuated by solenoid valves. Very accurate settings are possible, permitting the turret slide, for example, to drop from rapid traverse into feed for ¼" of travel and back to rapid traverse in two seconds, using top speed and .010" feed. Cross slides act either independently or simultaneously either in conjunction with selected turret faces, or with every turret face. Interlocking and compensating feed clutch operating members provide positive safeguards against conflicting clutch actions due to improper set up.

A time study based on the actual production of one of your parts will prove the speed, convenience and labor economy of the new 3U SPEED-FLEX Automatic Turret Lathe, Send us parts or prints and we'll furnish you with a complete report on tooling and actual production times of the new 3U SPEED-FLEX.

P & J

FEATURES

Modern, rigid construction throughout bed, turret and cross slides. Heavy, box type base.

All high speed shafts and spindle mounted on anti-friction bearings.

Hardened and ground steel ways for turret slide mounted in base. Hardened and ground steel insets in the turret slide.

All gearing of chrome vanadium steel, heat treated and shaved.

Standard spindle speed range: 73-1445 R.P.M. Optional dual range: 36-711 and 73-1445 R.P.M.

Turret slide and cross slide feed ranges from .0023" to .0684" or from .0042" to .125" per spindle revolution.

Swing over cross slide: 8¾". Cross slide travel each way: 2½". Turret slide travel: 6".

Bijur lubrication of turret slide and bed ways. Cascade oiling of all bearings and gearing in the aluminum gear box.

Turret automatically clamped in position after indexing. Combination locking and binding wedge assures accurate alignment with spindle.

Speed and feed change operating air cylinders of copper ferrite, honed to .0002". Piston of hardened steel, Parker-luberized to prevent rusting from water in air line.

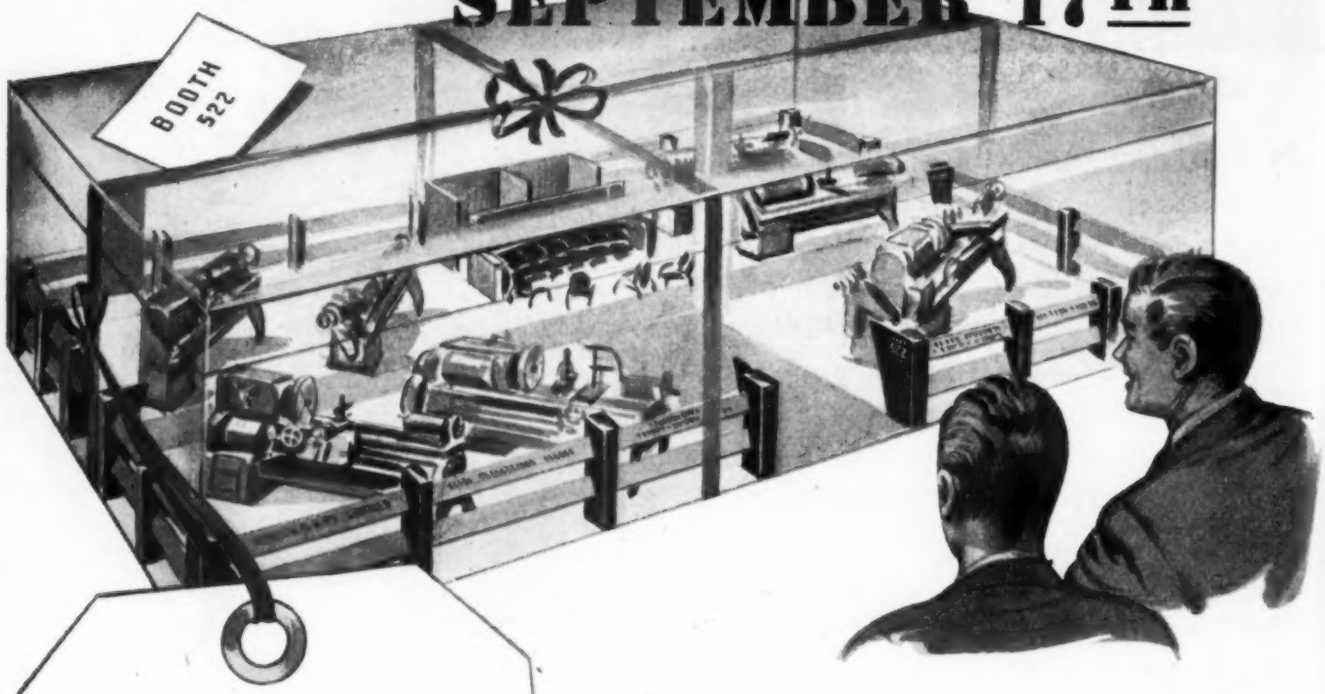
Full electric controls. Automatic stop at completion of work cycle. Complete safety features for protection of operator and machine.

N MACHINE COMPANY

RHODE ISLAND

UNWRAPPED!

SEPTEMBER 17TH



At the Machine Tool Show

You will see in operation

1. The "Standard CINTILATHE" Line.

see

2. Two original applications of "tracer control".

see

3. Completely new light line of "CINTILATHES".

1.—These lathes of "outstanding value" handle a wide variety of turning, boring and threading operations either for long or short run lots and offer you many practical profit-making features—

Simplified Design	Simple Construction
Capacity Plus	Minimum Investment
Long Life	Ease of Operation

2.—New and unique all hydraulic sensitive tracer control incorporating, under license, developments based on many years of research and practical application.

3.—The New Light Line of Cincinnati Lathes embodies features never before included in lathes of their size and price range.

Write for our circulars and prices.

Booth 522 Machine Tool Show Dodge Plant, Chicago Sept. 17-26

We extend to you a cordial invitation to see our Lathes in operation at the Dodge Plant, Chicago, Illinois →

CINCINNATI LATHE & TOOL CO.

CABLE ADDRESS: CINTILATHE

OAKLEY, CINCINNATI 9, OHIO

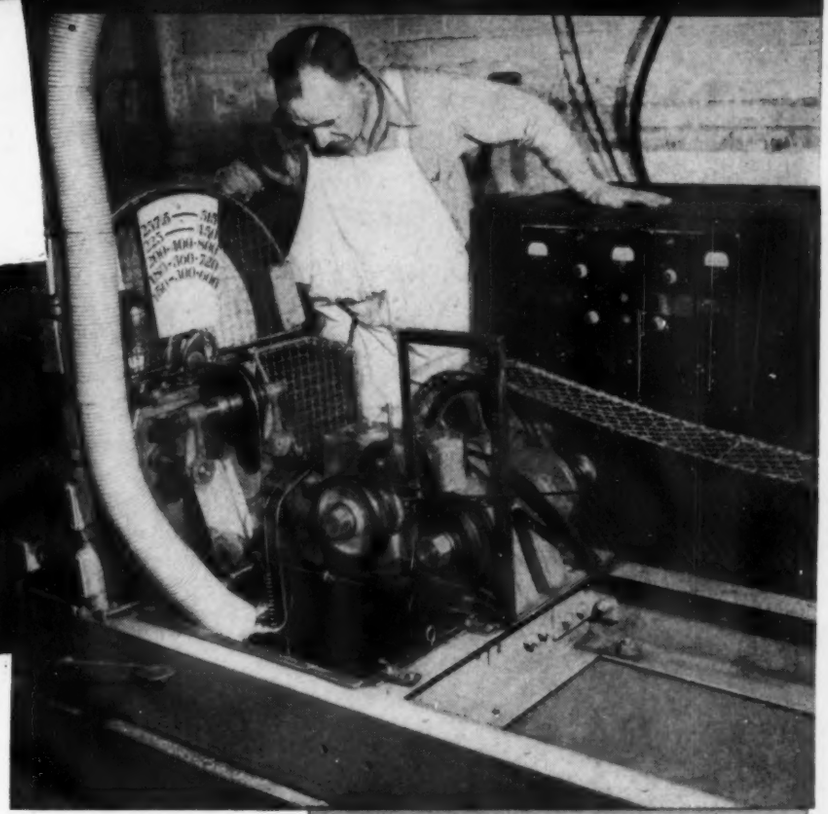
ELECTRONIC HEATER CUTS HANDLING COSTS BY CONTINUOUS STRESS-RELIEVING

THE JOB . . .

At Teleflex Inc., Philadelphia, an important step in the manufacture of steel control cable is heat treating, in order to reduce stresses resulting from the stranding operation.

THE OLD METHOD . . .

In order to stress-relieve cable in a gas-fired furnace at the production rate of the stranding machine, it was necessary to wind the strander's output on four separate reels. After these costly handling and reeling operations, four cables were run through the furnace in parallel, quenched, and reeled.



THE *NEW* INDUCTION METHOD

Out of the strander . . . Into the heater . . . On to the reel

The cable is now passed from the strander directly into the work coil of a G-E 5-kw electronic induction heater, where it is stress-relieved at stranding speed. After heat-treatment, the cable passes into a lard-oil quenching bath and directly on to the reel for final inspection. The entire operation is performed continuously in a compact, automatic equipment.

HERE'S WHAT INDUCTION HEATING HAS DONE FOR THIS COMPANY

1. **Cut Costs**—by eliminating intermediate winding operations, substantial savings are realized on labor and equipment.
2. **Reduced Floor Space**—by making possible a compact, efficient equipment, 300 square feet of floor space are now available for other purposes.
3. **Better Product**—with induction heating's close quench control, over-deposits of carbon are eliminated, giving a cable of a higher, more uniform quality.
4. **Increased Efficiency**—by helping to make cable manufacture a continuous operation.

GENERAL ELECTRIC

WHAT CAN ELECTRONIC INDUCTION HEATING DO FOR YOUR PRODUCT?

We would welcome the opportunity to give you an unbiased answer to this question. Simply get in touch with the Heating Specialist in the nearest G-E Office. In the meantime, send the coupon for our free bulletin GES-3290A, "The How and What of Electronic Induction Heating."

Apparatus Department, Sect. C675-153
General Electric Company
Schenectady 5, N. Y.

Please send me your free bulletin GES-3290A, "The How and What of Electronic Induction Heating."

Name .....

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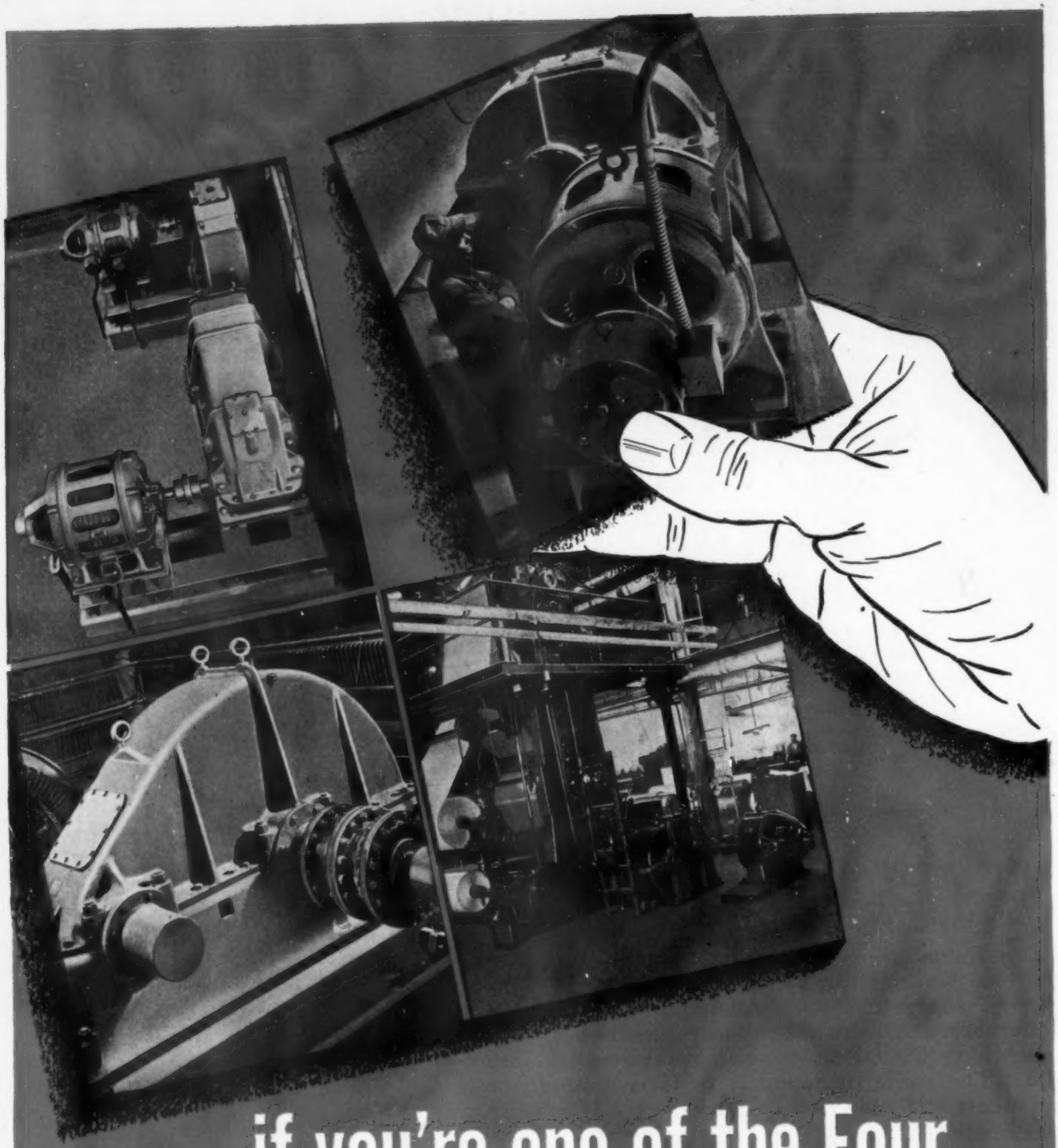
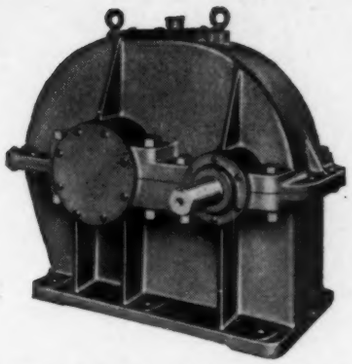


if you're one of the Four...

YOU'LL WANT THE 6 BENEFITS OF THIS PACKAGED DRIVE

WESTINGHOUSE

MEMBER OF AGMA



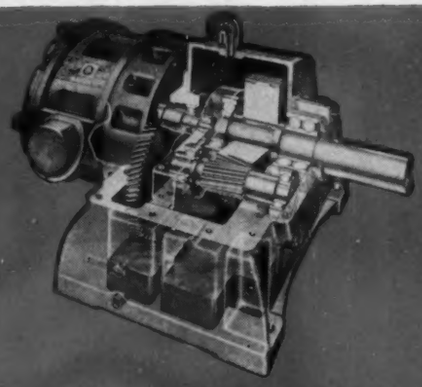
This Type SH speed reducer is a single-reduction unit which is furnished in thirteen standard ratios in each of twelve sizes. The Type DH speed reducer, which is a double-reduction unit, is offered in fifteen standard ratios in each of twelve sizes.

If your machines are among the four out of five that run slower than their prime movers, here are six ways you can profit by using Westinghouse speed reducers:

1. Improved power efficiency (one plant raised it from 80.9% to 85.4%).
2. Fewer inspections . . . only semiannual lubrication needed.
3. Maintain positive alignment of drive and driven machine.
4. Long service life through single helical gearing, specially heat-treated by exclusive Westinghouse BPT process.
5. Minimum power loss with antifriction bearings.
6. Precision operation from hot-cut gears.

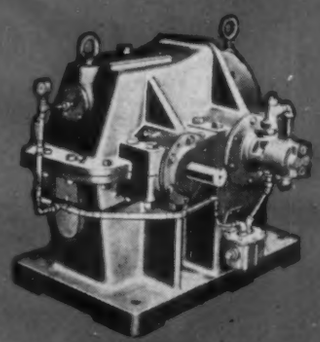
Add to these benefits the advantage of unit responsibility with both motors and gear supplied by one manufacturer. You have your choice of twenty-four sizes of Westinghouse speed reducers—Types SH and DH—for drives up to 1,000 hp with speed reduction ratios of 2.82 to 70.5.

Write, wire or telephone to your nearest Westinghouse office today, for full information on the application of speed reducers to your own drives. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-07252



FOR DRIVES FROM 1 TO 75 HP CHOOSE GEARMOTORS

Within the standard listed range of 1 to 75 hp ratings, you get the best in speed reduction with Westinghouse gearmotors. Three types—A, C and E—are available and provide output speeds from 1,450 to 16.5 rpm. All unit types can be used with either single-phase, polyphase or d-c motors.



USE THESE HIGH-SPEED UNITS UP TO 2,000 HP AND 9,000 RPM

These Westinghouse Type SU units are specially designed for high-speed duty in speed increasing services for pumps, compressors and similar applications. Units are available in 30 sizes—with gear ratios from 1.25 to 3.25 up to 2 to 12.

You'll find all the facts on industrial geared drives in this new, picture-packed book. Ask for your copy of B-3730 today, on your business letterhead, please.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

4 out of 5 drives need speed reduction

Do you grind away profits every hour?

One thing about grinding costs—you can grind away profits every hour without even suspecting it.

There is a way to eliminate those production inefficiencies that creep in. That way is the Peninsular method of complete grinding analysis.

Here's our proposal: Let Peninsular Engineers give your grinding a thorough study. Peninsular has specialized since 1889 in discovering hard-to-find grinding waste. In all probability, Peninsular Engineers can also save you money—once they've analyzed your operation.

This analysis includes a complete study of your equipment, the material to be ground and all other factors that influence grinding costs. Equipped with such knowledge, Peninsular Engineers are able to give you job-designed performance at minimum cost.

The Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7, Michigan. *Sales Offices:* Chicago, Philadelphia, Boston, Buffalo, Cleveland, Pittsburgh, Houston, St. Louis, Cincinnati.

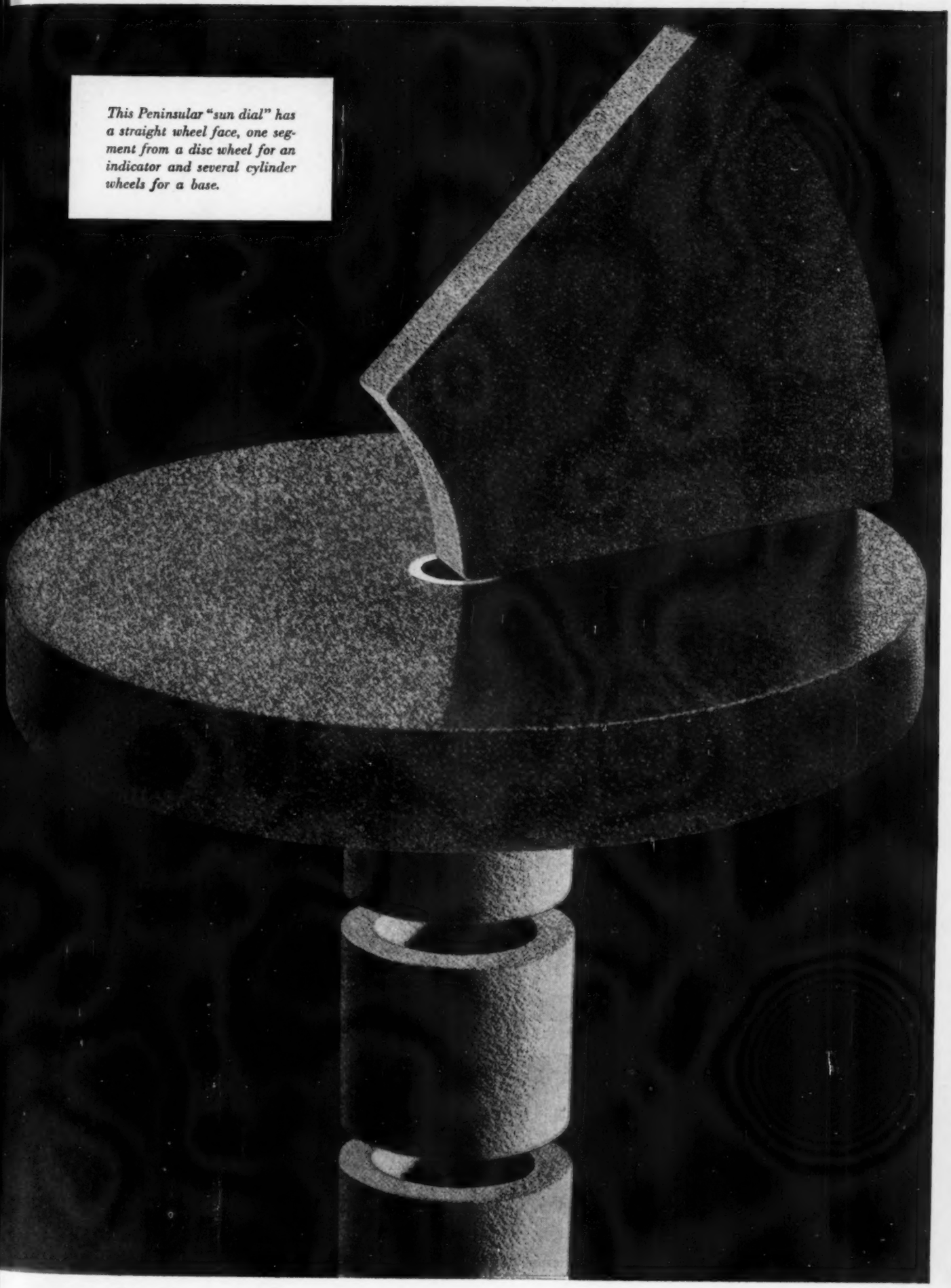
PENINSULAR

INDIVIDUALLY PENINSULAR *ENGINEERED*

GRINDING WHEELS

SINCE 1889

SPECIALISTS IN RESINOID BONDED WHEELS



This Peninsular "sun dial" has a straight wheel face, one segment from a disc wheel for an indicator and several cylinder wheels for a base.

1. Bauxite from South American deposits is unloaded and stockpiled at the Baton Rouge plant of The Permanente Metals Corporation, where it is converted to *alumina.* The plant, located on the Mississippi River, comprises 34 buildings on a 318-acre river site, is capable of turning out one billion pounds of alumina per year. It requires four pounds of bauxite ore to make two pounds of alumina.

KAISER ALUMINUM

FROM ALUMINA TO FINISHED ROLLING, PERMANENTE METALS CONTROLS EVERY STEP IN THE PRODUCTION OF KAISER ALUMINUM, ASSURING QUALITY PIG, INGOT, PLATE, SHEET, STRIP, AND ROOFING.

It's something of an achievement to turn out, in a single year, almost as much aluminum as the entire industry produced in the most productive year before the war.

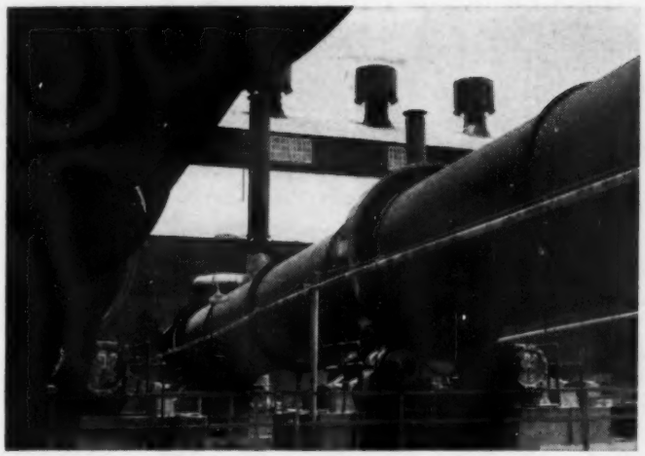
It's even more of an achievement to gain a reputation for quality and service at the same time. One reason The Permanente Metals Corporation has gained this reputation is its integrated operation—from alumina to the finished product.

The story here takes you from the delivery of bauxite at Baton Rouge to the rolling of finished aluminum at Permanente Metals' Spokane mill, with capacity of 288 million pounds yearly.

But no pictures and text can convey to you the eagerness of this young-minded organization to serve the buyers of aluminum . . . to tackle the toughest problems . . . to take its place as a vital factor in this age of light metals.

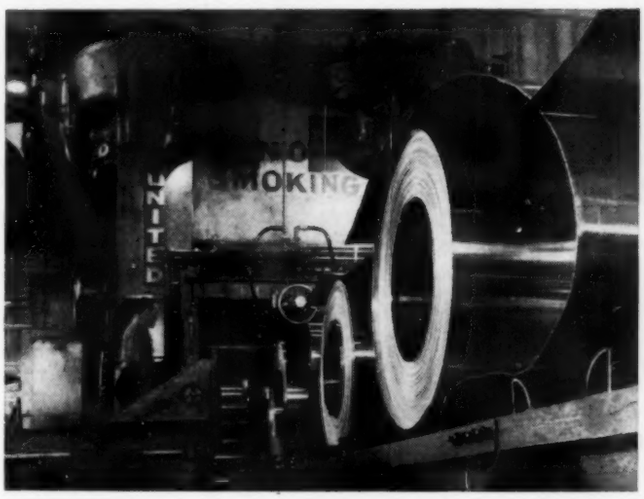
Kaiser Aluminum is a product second to none—not merely as a *substitute* for other metals and materials, but as their *successor* in the scores of applications where aluminum can add something new: lightness, strength, workability, resistance to corrosion, beauty.

And this aluminum is here *today*—ready to meet your requirements!



2. It isn't alumina yet—but this view in the Baton Rouge plant shows the final step in processing. These giant rotary kilns operate at 1800 degrees F., and cook the alumina hydrate into snow-white alumina powder. This alumina is then loaded into box cars and goes by rail to Permanente Metals' reduction plants at Spokane and Tacoma, Washington, where it is converted into basic aluminum.

3. Spokane, Washington, is the home of the reduction plant of The Permanente Metals Corporation, where alumina is made into basic aluminum. Another reduction plant, at Tacoma, increases the supply needed to keep the Spokane rolling mill operating at capacity. Reduction process requires tremendous power. Metal is cast into pure aluminum pigs, then sent to rolling mills for remelting and alloying.



4. The rolling mill at Spokane is capable of producing more than 288 million pounds of aluminum yearly. Two-ton ingots of alloyed aluminum are hot-rolled into long strips. Cut into sheets, the metal is cold-rolled to proper specifications (above). Careful handling and constant testing assure outstanding quality. This plant comprises 53 acres. Plate, sheet and strip are loaded directly into cars for shipping.

5. Here's why Kaiser Aluminum is in demand: Permanente Metals' representatives really give service. Delivery promises are kept. Quality exceeds specifications. Top technical brains are always at your service, may cut your costs through sound advice. Though Permanente Metals itself is but one year old, its administrators, engineers and operators have had years of experience in the aluminum industry.

Ready to serve you—*today...*

Kaiser Aluminum

a Permanente Metals product

DISTRIBUTED BY PERMANENTE PRODUCTS COMPANY, KAISER BLDG., OAKLAND, CALIFORNIA...WITH OFFICES IN: Seattle, Wash. · Oakland, Calif. · Los Angeles, Calif. · Dallas, Texas · Wichita, Kan. · Kansas City, Mo. · St. Louis, Mo. · Atlanta, Ga. · Minneapolis, Minn. · Milwaukee, Wis. Chicago, Ill. · Cincinnati, Ohio · Cleveland, Ohio · Detroit, Mich. · Boston, Mass. · Hartford, Conn. · Buffalo, N.Y. · New York City, N.Y. · Philadelphia, Pa. · Washington, D.C.

We'll be... LOOKING FOR YOU at A.H.Q.*

IN CHICAGO AT THE DODGE-CHICAGO PLANT

*ACCURACY HEADQUARTERS

will be the Pratt & Whitney Booth at the Machine Tool Show. You won't want to miss a long visit at A.H.Q.

You won't be *able* to miss it—for the P&W Booth will be one of the largest at the show . . . 6000 square feet of floor space crammed with P&W Accuracy at work. Toolroom equipment will include the newest in jig boring practice, surface grinding, gear grinding, thread milling. A whole section will contain P&W Lathes—"the standard by which all fine lathes are judged." Of course the Keller machines will be in full operation—doing everything from small mold and die cavities up to Kellering very large automotive dies. The full line of P&W Die Sinkers will be at work plus an exhibit of die jobs done at savings you can't afford to miss. Here also will be Kellerflex machines and attachments demonstrating the phenomenal cutting abilities of the newest Keller Carbide Burs. You'll find taps, dies, milling cutters, reamers—all the newest cutting tools including carbides. And of course you'll find the latest P&W Gages, engineered into efficient setups for modern quality control or selective assembly.

MACHINE TOOL SHOW CHICAGO SEPT. 17-26

There, too, you'll meet the men who engineer P&W Accuracy into the tools you use. They'll be available for consultation on your precision problems. And there will be comfortable chairs where you can sit and talk over your shop problems.

We'll be looking for you at A.H.Q. Please feel welcome to come early and often and to stay as long as you can.

Booth No. *55* in the *northeast* corner

PRATT & WHITNEY

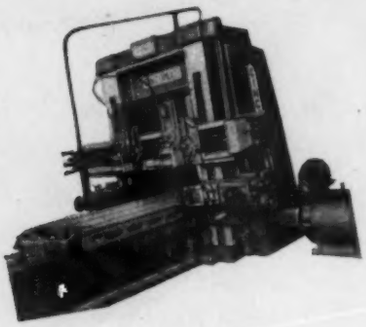
Division Niles-Bement-Pond Company

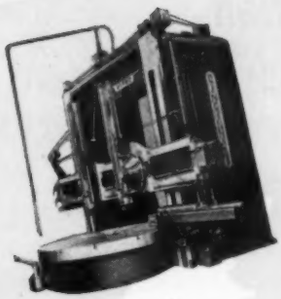
WEST HARTFORD 1, CONNECTICUT

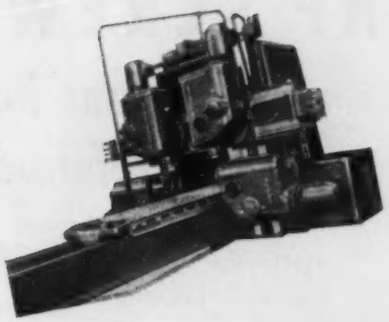
This is your personal invitation to visit us at the-

MACHINE TOOL SHOW
WATCH! CINCINNATI HYPRO

Plane at ??? feet per minute
Mill your ??? electronically on our planer miller
Maintain ??? ??? ??? electronically on our Vertical Boring Mill







CHICAGO ●

MACHINE TOOL SHOW
Dodge Plant - Chicago, Illinois, September 17-26, 1947
Booth Number – 220

THE CINCINNATI HYPRO PLANER COMPANY

PLANERS • BORING MILLS • PLANER TYPE MILLERS

CINCINNATI 9, OHIO

UNBRAKO

Reg. U. S. Pat. Off.

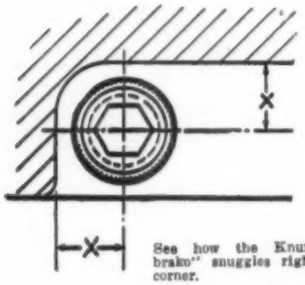
Knurling of Socket Screws originated with "Unbrako" in 1934.

KNURLED SOCKET HEAD CAP SCREWS

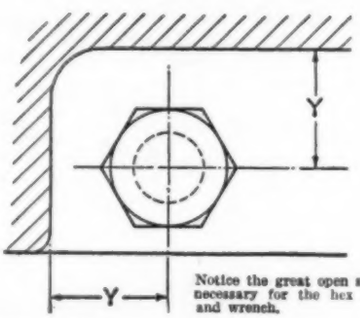
prevent lost motion therefore save assembly time

They speed assembly because their knurled heads provide a slip- and fumble-proof grip—be the fingers and head ever so oily—therefore, they can be screwed-in faster and farther before it becomes necessary to use a wrench. Their internal wrenching feature facilitates compact designs, so space, and weight are saved and cost reduced. Millions upon millions of these time-savers —in sizes from No. 4 to 1½" in diameter and in a full range of lengths—are being used throughout industry. Write for the "Unbrako" Catalog.

"Unbrako" and "Hallowell" Products are sold entirely through Industrial Distributors.



See how the Knurled "Unbrako" snuggles right into the corner.



Notice the great open spaces necessary for the hex head and wrench.

OVER 44 YEARS IN BUSINESS

"UNBRAKO" SOCKET SET SCREW WITH KNURLED CUP POINT

The knurled cup point of this "Unbrako" makes it a Self-Locker, the points dig in and hold fast even when subjected to the most shattering vibration.

Pat'd and Pats. Pend.

"UNBRAKO" SOCKET SET SCREW WITH KNURLED THREADS

Knurling the "Unbrako" Socket Set Screw, as shown, swages the threads and an excellent Self-Locker is the result—For use where the points such as: flat, dog cone and oval do not lend themselves to knurling.

Pat'd and Pats. Pend.

"FLEXLOC" SELF-LOCKING NUTS

The All-Metal One-Piece "Flexloc" is a Self-Locking Nut that won't budge, except when a wrench is used. Every thread—takes its share of the load and being a "stop" nut it will stay locked in any position on a threaded member—"a real fastener", if ever there was one. Free samples.

Pat'd and Pats. Pend.

"HALLOWELL" KEY KIT

Pats. Pend.

You can't screw socket screws in or out without a hex socket wrench, so why not get our No. 25 or No. 50 "Hallowell" Hollow Handle Key Kit which contains most all hex bits.

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA., BOX 4 • BRANCHES: BOSTON • CHICAGO • DETROIT • INDIANAPOLIS • ST. LOUIS • SAN FRANCISCO

The CONE AUTOMATIC MACHINE COMPANY sees many GOOD THINGS AHEAD

It is reported that . . . . . .

White Sewing Machine Co. stores its lumber on wheels, thus reducing the number of handlings from six to one.

get ready with CONE for tomorrow

Chesapeake and Ohio is planning to buy a thousand freight cars equipped with roller bearings.

be ready with CONE for today

Commonwealth Edison Co. has a "cyclone" burner in its Calumet Station that removes 80% of the coal ash as molten slag in the burner.

get ready with CONE for tomorrow

Britain's Southern Railroad is laying track in complete prefabricated 60-foot sections.

be ready with CONE for today

Caterpillar Tractor Co. is using electronic rectifiers in place of motor-generator sets to convert AC current to DC for the operation of machine tools.

get ready with CONE for tomorrow

Manuel Gonzales, a Civil Engineer of Mexico City, builds multiple story, poured concrete buildings by laying the top floor first and suspending the forms for each floor from the one above.

be ready with CONE for today

Timken-Detroit saves 400 pounds in the weight of its new heavy-duty tandem truck axle by using aluminum in housing, hubs and brake shoes.

get ready with CONE for tomorrow

DuPont is building a plant at Niagara Falls to make furfural from farm waste. The furfural will be made into Nylon.

be ready with CONE for today

American Optical Company has a new glass which absorbs 90% of yellow light and which is expected to be useful in goggles for workmen fusing glass in a sodium flame.

get ready with CONE for tomorrow

Simonds Saw & Steel Co. has a new dial indicator that registers the tension on a hack saw blade.

Electronic heating equipment made by Induction Heating Corp. reduces to seconds the time required to bake foundry sand cores.

be ready with CONE for today

A radiation counter that operates over a wider range than the familiar Geiger counter has been developed by Westinghouse.

get ready with CONE for tomorrow

Verdi Bros. of Jersey City are bringing the old-fashioned oak beer keg up to date by making it of nine-ply laminated wood.

be ready with CONE for today

The Armzen Co., of Middletown, Ohio, has designed a miniature cold strip mill for Westinghouse to roll their new magnetic alloy "Hiperco" as thin as .002 in.

A method of electroplating, in which the current is periodically reversed, has been developed by Westinghouse. The deposited film is said to be more dense and so smooth as to require no polishing.

get ready with CONE for tomorrow

Detroit Diesel Engine Div. of General Motors is in production on a new hydraulically operated transmission for their engines.

be ready with CONE for today

Pezzillo Pump Co. is making an electric pump that can be installed directly in a pipe line like any other fitting. The impeller and rotor are integral and the liquid flows through the motor.

get ready with CONE for tomorrow

A possible answer to the need for heat and stress resistant material for gas turbines, jets and rockets is a new crystalline porcelain announced by the U. S. Bureau of Standards.

FOLLOW THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION

CHICAGO SHOW

CONOMATIC REVIEW

This page, September issue, will feature

NEW MODELS

innovations — improvements

•

CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.

42

...er performer...

WARNER & SWASEY EXHIBIT

Booth No. 309

Chicago • September 17-26

MORE GOODS FOR MORE PEOPLE
AT LOWER COST

You Can Machine it
Better, Faster, for Less...
with a Warner & Swasey

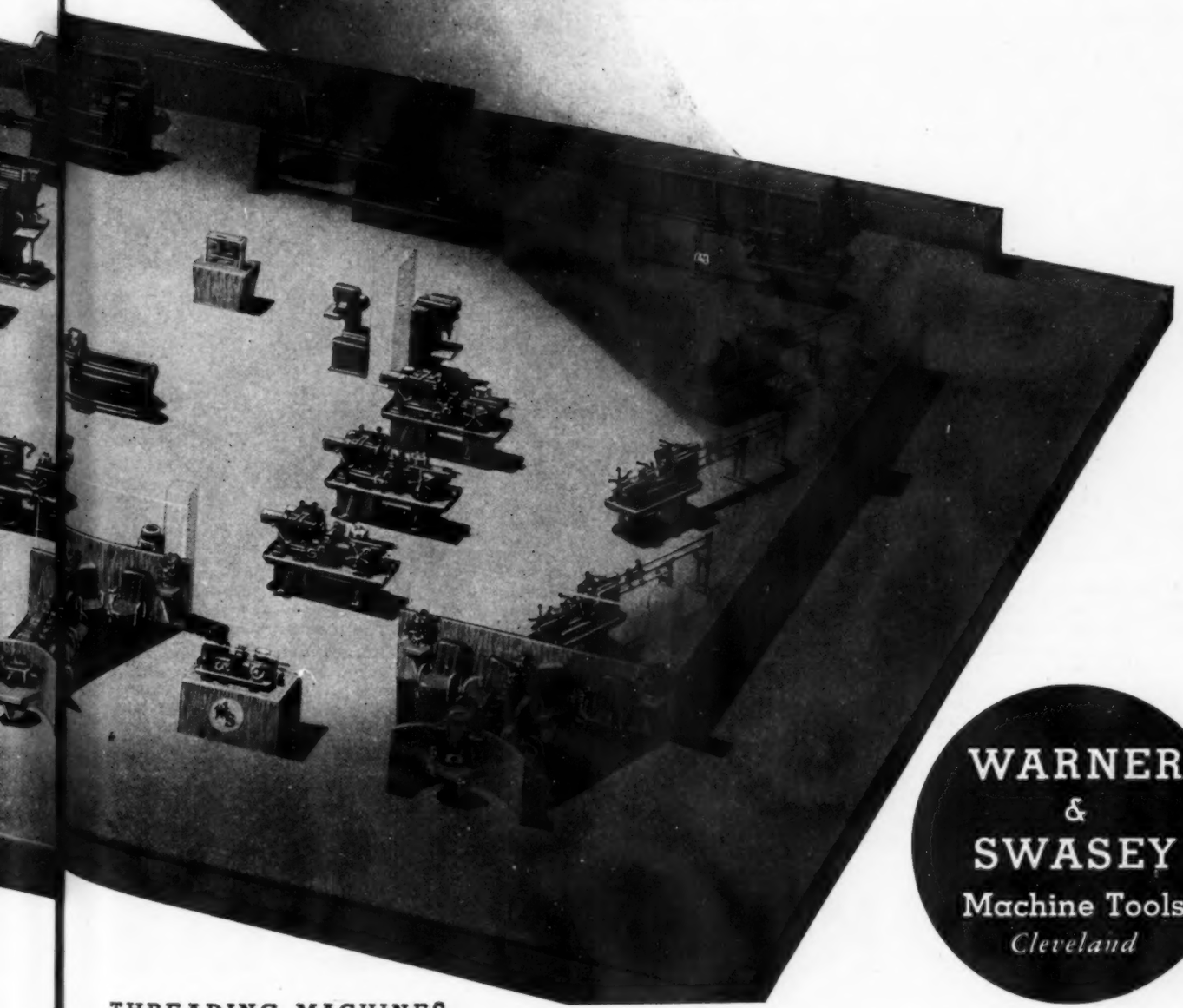
TURRET LATHES, MULTIPLE SPINDLE AUTOMATICS, PRECISION TAPPING AND

1947 Machine Tool Show

MANY new Warner & Swasey machines, tools, chucks and accessories will be shown and publicly demonstrated for the first time at the 1947 Machine Tool Show.

The largest audience of metal working executives and production men ever assembled will see the latest designs in Warner & Swasey Turret Lathes, featuring Electro-Cycle models, the last word in "camless" Multiple Spindle Automatics, improved tools, and a new line of collets and chucks.

Come to the Chicago Machine Tool Show, and plan to give plenty of time to the Warner & Swasey display. We promise everyone interested in machining of metals will find invaluable ideas in the demonstration of new machine tools and methods.

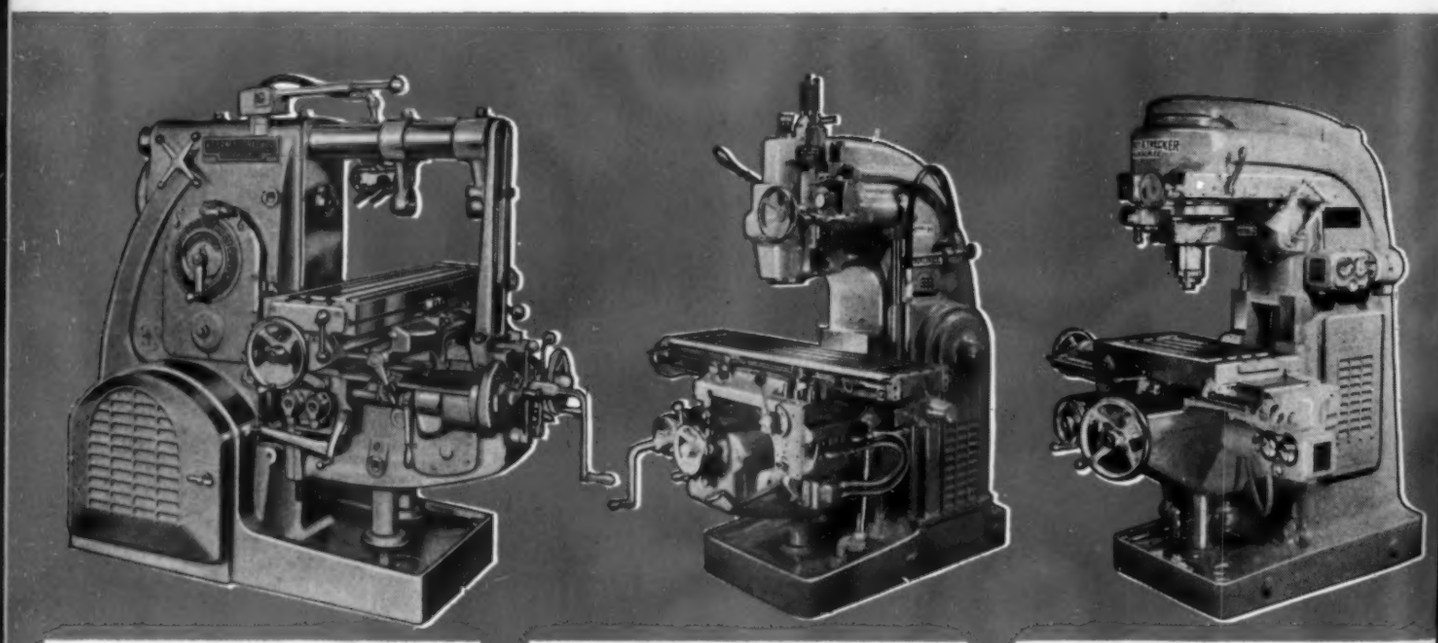


WARNER & SWASEY
Machine Tools
Cleveland

MACHINE TOOL

Kearney & Trecker presents tomorrow's
wait one, two or three months for

1 MILLING MACHINES AT THEIR BEST— DESIGNED TO PUSH COST CURVES DOWN!



CSM Milling Machines— Super-powered— Set new high metal removal records!

Here's the machine that really *uses Carbide cutters to top efficiency.* This means a big boost in your production. You can get either Plain or Vertical Types in two working ranges with either 20, 30 or 50 horsepower.

Write for bulletin No. CSM-20.

Automatic Cycle Models —Combine hi-production use with Knee-type versatility!

Yes! You get automatic operation for long-run lots . . . new, simpler and easier control for short-runs. Your choice of 34 different Knee-Type Automatics, Plain or Vertical models in 14 different sizes and horsepower.

Write for bulletin No. AC10.

Rotary Head Milling Machine — Revolutionary! Produces any geometric shape!

The most versatile milling machine you ever saw! Works on entirely new principles. Mills any geometric form *without* models, templets or tracing devices. Can practically *guarantee 35% savings* on most tools, dies, molds.

Write for bulletin No. 1002C.

See these and other great new Kearney & Trecker machine tools at the Machine Tool Show Sept. 17-26

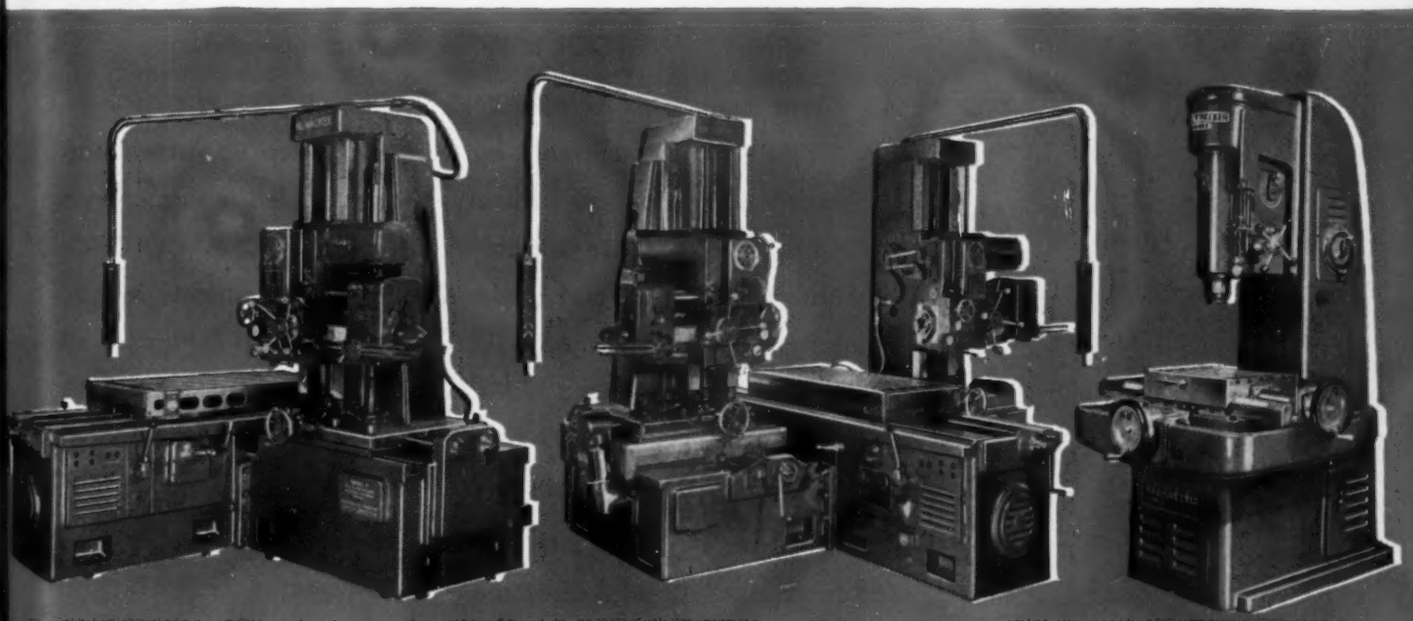
KEARNEY &

CORPORATION

PRE-VIEW . . .

machines today . . . and you don't have to them . . . They're available right now!

2 BORING MACHINES AT THEIR BEST— DESIGNED TO PUSH PRECISION CURVES UP!



Models No. 3T and No. 3TT Precision Milling and Boring Machines — Specifically built to meet exacting requirements of ultra-close tolerance milling and boring on production, tool, jig or fixture work.

You can put the most exacting of "plus-or-minus tolerance" milling or boring jobs on either of these machines and be *perfectly confident* of top results. For single-spindle applications, the Model T machine provides wide working range. The Model No. 3TT can be used for performing precision milling and boring operations simultaneously on single workpiece without resetting. Both machines are ideally suited to precision and production boring and milling. Yes — for "fussy" development or tool room jobs you'll get the kind of precision you're looking for.

Write for bulletin No. T11A.

Model C Autometric — America's top machine for Precision Boring.

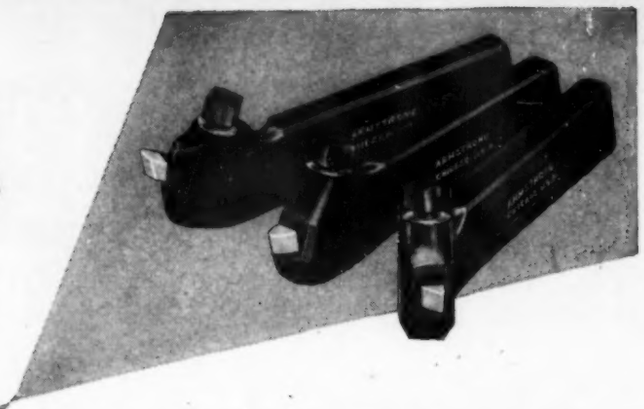
You get the benefit of nearly a half century of research in precision boring and the most exacting machine standards ever set at Kearney & Trecker. The Model C Autometric will produce incredibly accurate results for you.

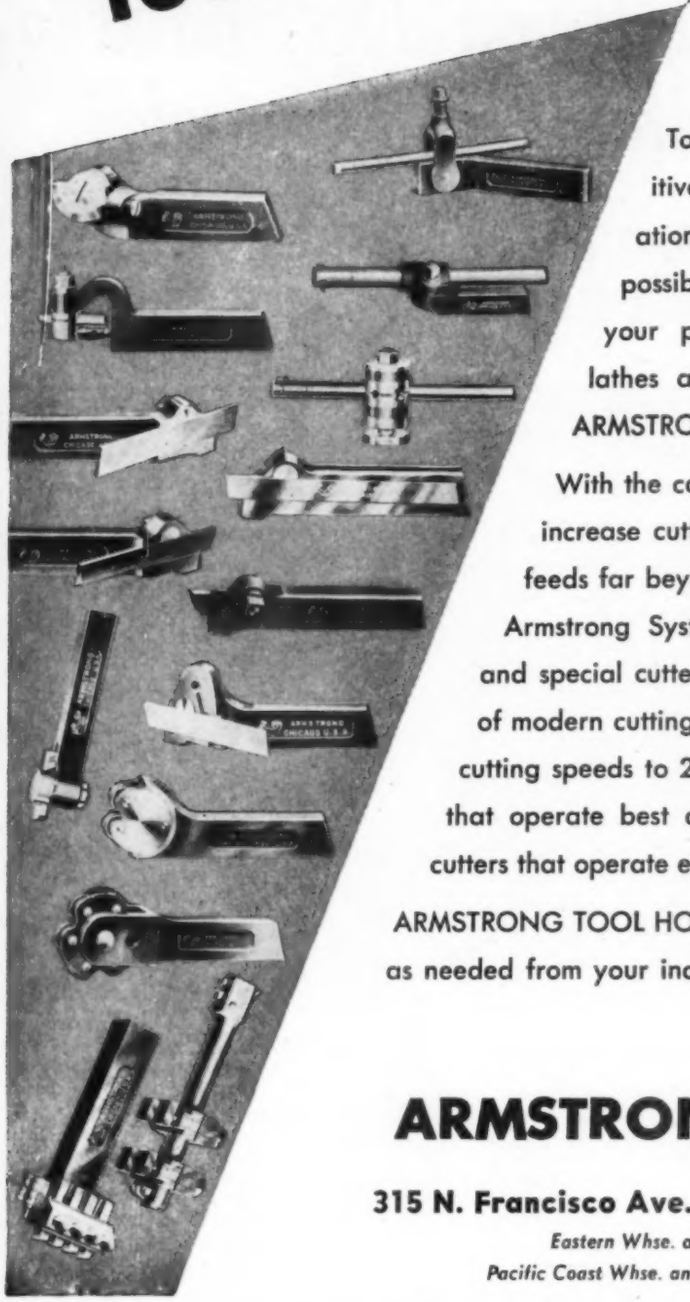
Write for bulletin No. CMA-10A.

TRECKER

MILWAUKEE 14, WISCONSIN

ARMSTRONG TOOL HOLDERS





Produce more at lower cost with ARMSTRONG TOOL HOLDERS

Today's problem of producing more without prohibitive costs is easily answered on many machining operations by the Armstrong System of Tool Holders. It is possible to materially increase output per man hour on your present lathes, planers, slotters, shapers, turret lathes and screw machines, by simply using the correct ARMSTRONG TOOL HOLDER for each operation.

With the correct ARMSTRONG TOOL HOLDERS you not only increase cutting efficiency but can safely step up speeds and feeds far beyond those ordinarily used. Included in the modern Armstrong System are special ARMSTRONG TOOL HOLDERS and special cutter bits and blades that cover the complete range of modern cutting speeds. ARMSTRONG HIGH SPEED cutters for all cutting speeds to 200 f.p.m., ARMALOY (Cast alloy) Bits and Blades that operate best around 300 f.p.m. and ARMIDE (carbide-tipped) cutters that operate efficiently at rates as high as 600 f.p.m.

ARMSTRONG TOOL HOLDERS, Bits, Blades and Cutters, can be picked up as needed from your industrial distributor.

Write for Catalog.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

315 N. Francisco Ave. **Chicago 12, U. S. A.**

Eastern Whse. and Sales: 199 Lafayette St., New York 12, N. Y.
Pacific Coast Whse. and Sales Office: 1275 Mission St., San Francisco 3, Calif.

HARDINGE
ELMIRA, N.Y.

HIGH SPEED

PRECISION PRODUCTION MACHINES

The production of precision parts today requires tool room accuracy with high speed operation to reduce and then maintain lower costs. These machines are both designed to increase the output of parts to extremely close tolerance and finish specifications. The precision qualities of these machines, combined with the simplicity of operation, assure lower costs.

SECOND OPERATION MACHINE: 1" collet, 6" step chuck, 5" jaw chuck capacity; eight spindle speeds to 4000 r.p.m.; preloaded ball bearing construction for spindle and turret; hardened and precision ground steel ways; turret and cross slide operating levers are adjustable to suit the operator.

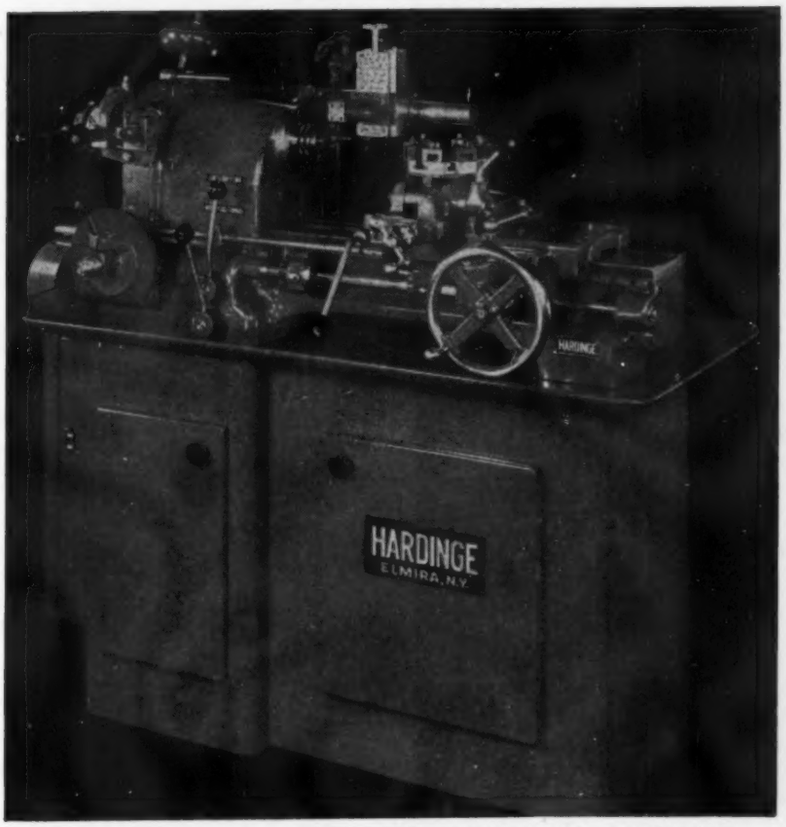
Write today for bulletin DSM59 which illustrates and describes the Second Operation Machine.

MULTI-OPERATION CHUCKING MACHINE: This machine has the same capacity as the Second Operation Machine. In addition, it has an eight-position turret, production threading head and power feed for the carriage.

Write today for bulletin HP which shows how this machine can handle various jobs, using standard tool bits only . . . for low-cost tooling.

See these machines in operation in Booth No. 45 at the Machine Tool Show Sept. 17-26 at the Dodge-Chicago Plant.

HARDINGE SECOND OPERATION MACHINE



HARDINGE MULTI-OPERATION CHUCKING MACHINE

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

A Dependable Working Partner

BETTS 100" BORING AND TURNING MILL

For full details send for Bulletin No. 2128

Among Heavy Machine Tools built by Consolidated are . . . .

LATHES
BORING MILLS
DRILL PRESSES
MILLING MACHINES
BORING MACHINES
COLD SAW MACHINES
BORING, DRILLING AND MILLING MACHINES
DRILL AND TOOL GRINDERS
PLANERS
SLOTTERS
RAILROAD SHOP TOOLS
AUTOMOTIVE TOOLS AND OTHER SPECIAL MACHINES

BETTS BORING AND TURNING MILLS are built from 100" up to any requiremen

As in all Betts machines, the accumulated experience of more than three-quarters of a century is built into this general purpose boring mill . . . another striking example of Consolidated's ability to combine accuracy and power with maximum productiveness.

William Sellers & Co., Machine Tools are now built by William Sellers Division Consolidated Machine Tool Corporation

BOOTH No. 423 MACHINE TOOL SHOW

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848

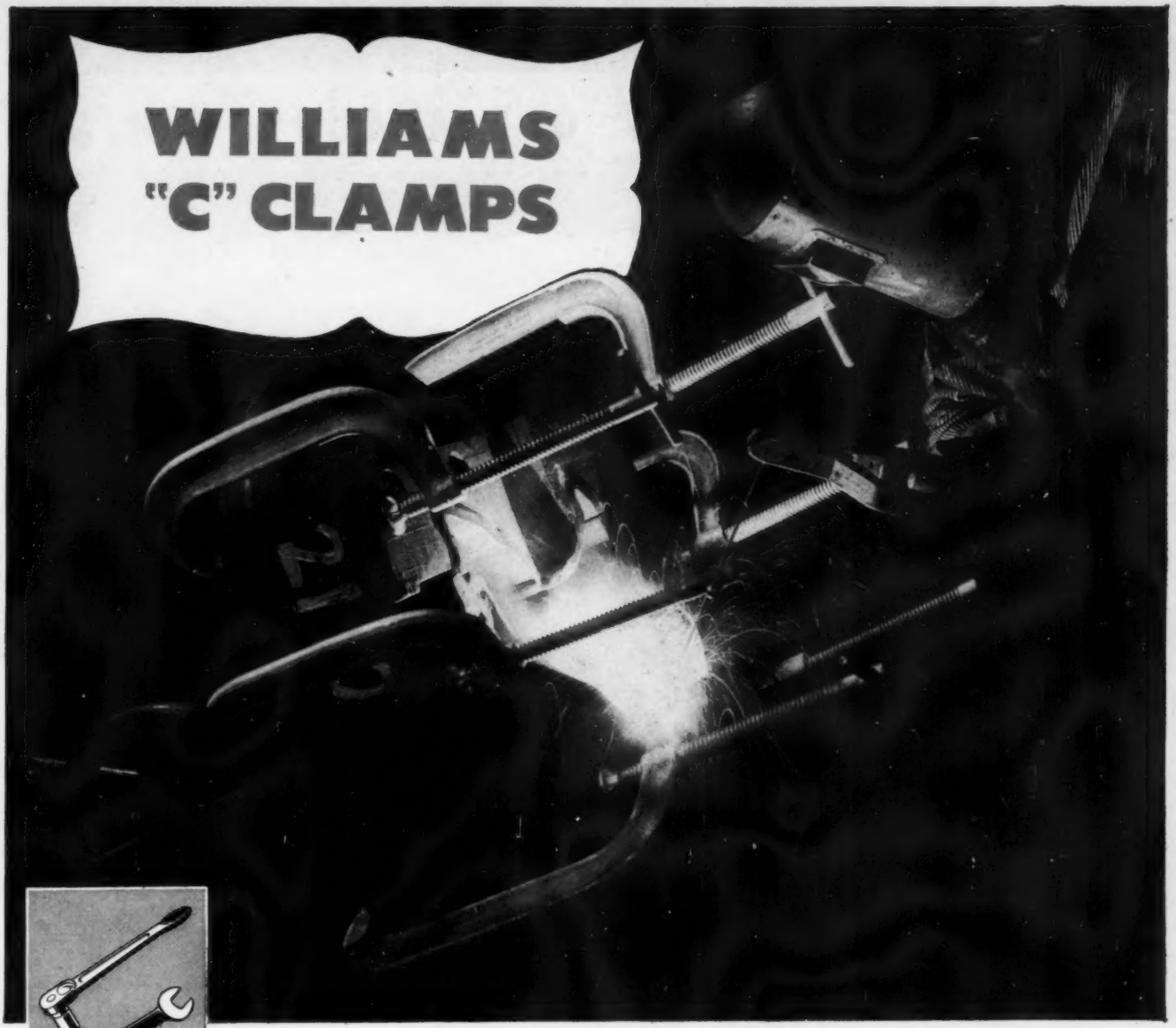
BETTS • BETTS-BRIDGEFORD • COLBURN • HILLES & JONES • MODERN • NEWTON • SELLERS

CONSOLIDATED MACHINE TOOLS

CONSOLIDATED
MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

WILLIAMS "C" CLAMPS



for Positive Holding Power

For those countless *holding* jobs daily encountered in shop or plant, you can't beat the slip-proof grip of Williams "C" Clamps. They are *drop-forged* from tough, selected steel—specially heat-treated to further increase their strength and reduce any liability of springing.

Williams Clamps are available in a variety of patterns and sizes for light, general and heavy duty. The clamps illustrated have a special spatter-resisting finish for welding service. All screws are hardened, tempered and threaded U.S. Standard. Sold by Industrial Distributors everywhere. J.H. Williams & Co., Buffalo 7, N.Y.

WILLIAMS
DROP-FORGINGS AND DROP-FORGED TOOLS

2 WAYS TO GET ACCURATE HIGH-

● Simple jobs—or tough ones; there's an Acme-Gridley Chucker to give you automatic production faster—better—at lower cost.

Put the simpler jobs on the Acme-Gridley Chuck-matic—National Acme's new 12" Single Spindle Chucker. It gives you heavy duty, high production on parts like bearing races, sheaves and rings.

Turn out the jobs requiring multiple operations—pistons, gear housings, couplings—on the 6"—8 Spindle Acme-Gridley Automatic Chucker—built to carry more tools and attachments for any given job.

Both of these Acme-Gridley Chuckers are designed for easy setup—quick change from

USE A 12" Single Spindle CHUCK-MATIC

MACHINE TIME:
LESS THAN 10 SECONDS

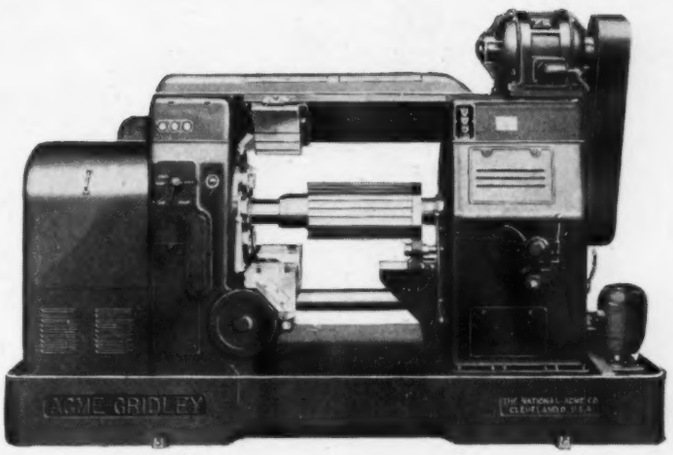
PART: Starter housing, 4½" dia. x 7¼" long. Made from tubing. Chamfer, break corners and face both ends.

SEE THIS EQUIPMENT
DEMONSTRATED
Booth 628
Machine Tool Show
CHICAGO—SEPT. 17-26

SPEED CHUCKING WORK *at Lower Cost*

job to job—and minimum idle time. (All cams start and stop simultaneously.) And Acme-Gridleys are built for today's speeds and feeds, as fast as carbide-tipped tools can stand.

If your machining methods are obsolete, you can't price your products competitively. Obsolescence costs more than men or machines—it can force you right out of your markets. Split seconds spell the difference. May we show you how Acme-Gridleys can save time—on your jobs?

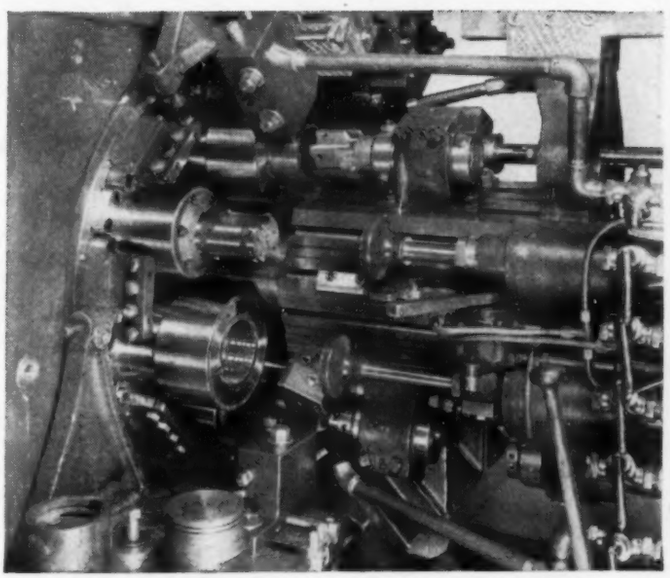


USE A 6"—8 SPINDLE ACME-GRIDLEY

TOTAL MACHINE TIME:
1 MIN. 26 SECONDS

FIRST OPERATION: (15 carbide-tipped tools) Double indexing with alternating internal and external chucks to rough-finish both ends at one set-up. Machine time, 27 seconds.

SECOND OPERATION: (Not shown) On same machine, double index to finish 2 pistons at each cycle. Machine time, 59 seconds.



The NATIONAL ACME CO.
170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog-Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

because they can be depended on for ECONOMY, EFFICIENCY *and* SPEED

All the essential performance qualities demanded in small tools today are met in UNION TOOLS.

Faster cutting, longer life between grinds, accuracy and all-round better performance of these tools are matters of common recognition in plants busy on work where small tools are subjected to the most exacting service conditions.

You, too, can depend on UNION TOOLS for your requirements. Try them once and you'll use them regularly.

THE UNION LINE

Twist Drills — Milling Cutters — Reamers — Hobs — Slitting Saws — End Mills — Taps — Dies — Screw Plates — Profile Cutters.

UNION TWIST DRILL COMPANY, ATHOL, MASS.

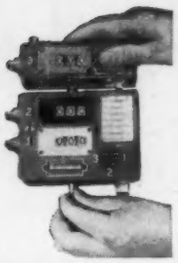
STORES—New York: 61 Reade St., Chicago: 11 So. Clinton St., Detroit: 5527 Woodward Ave., San Francisco: 121 Second St., Los Angeles: 524 E. Fourth St., Seattle: 568 First Ave., South.

MANUFACTURING DIVISIONS

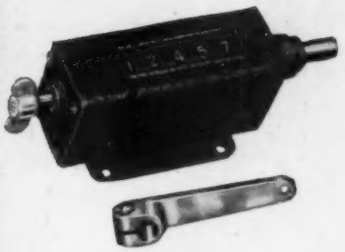
S. W. Card Mfg. Co. Div., Mansfield, Mass.
Butterfield Div., Derby Line, Vt.
Butterfield Div., Rock Island, Quebec.

UNION

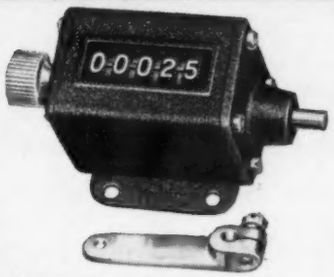
You Can COUNT on Veeder-Root Devices in more ways than you can think of



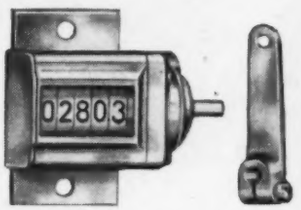
2-3 Pick Counters record the production of textile looms. Can be economically converted from 2 to 3 shift operation right in the mill.



High-Speed Reset Counters, used on coil-winders, etc.

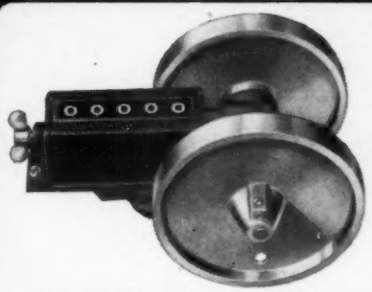


Small Reset Counters, used on office and light production machines.



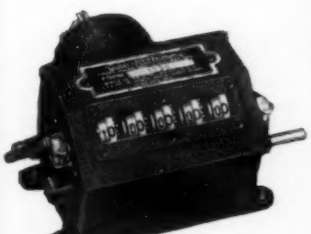
Small Square Case Counters, used on cash registers, office appliances, etc.

Hand Tally, adds one for each pressure on thumb-lever.



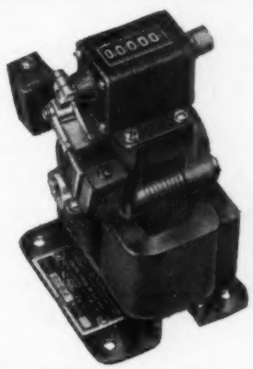
Worm-Driven Counters indicate in yards, feet, meters, other units.

Heavy-Duty Ratchet Counters count strokes on punch presses, etc.



Predetermining Counters stop machine or signal operator at pre-set count. Prevent overruns & shortages.

Medium Size Counters, used on machines of moderate speeds.



Magnetic Counters flash machine-output from factory to office, etc.

"VEEDER-ROOT COUNTS EVERYTHING ON EARTH" . . . motions, pieces, units, distances, light-flashes, gunfire, people, coins, sales, flow of fuel and water . . . and whatever *you* have in mind. Scores of different types of standard Veeder-Root Counting Devices are built into all types of products to add new utility, marketability, *profitability*. And special Veeder-Root Devices are continually being designed to do remarkable things in unheard-of applications. For a quick picture of counting possibilities, write for the new, brief book of "Facts-in-Figures."

Veeder-Root
INCORPORATED
Hartford 2, Connecticut
In Canada: VEEDER-ROOT OF CANADA, LTD.
955 ST. JAMES ST., MONTREAL 3
In England: VEEDER-ROOT LTD., DICKINSON WORKS,
20 PURLEY WAY, CROYDON, SURREY

Has Your Gage Supplier Told You about NORBIDE* Gages

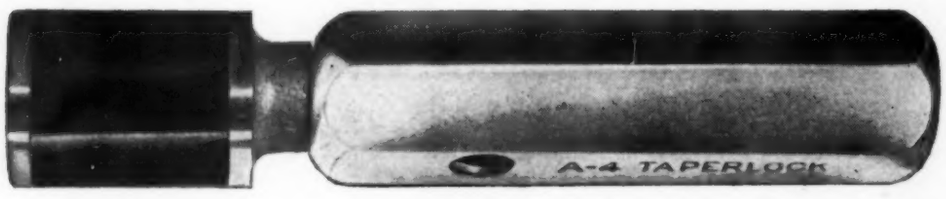
Are you being kept informed about NORBIDE Gages — the longest wearing gages ever made? Longest wearing? Yes, indeed, because they are made of Norton Boron Carbide — "the hardest material made by man." The extremely high resistance to abrasion of molded NORBIDE pieces has brought them into use for plug, ring, and keyway gages, contact points for dial indicators, anvils and spindles for snap gages and micrometers, and inserts for a wide variety of gages requiring wear surfaces. Furthermore, a NORBIDE piece is lighter than aluminum. It is chemically inert— being unaffected by acids, alkalis or oxidizing mixtures. Its coefficient of expansion is only one third that of steel. This material is stable—it does not creep, work or season with age. It never loses its hardness and wear resistance. If your gage supplier hasn't told you how to save money by using NORBIDE Gages — the longest wearing gages ever made, then we invite you to write to us:

Norbide Division

NORTON COMPANY

WORCESTER 6, MASSACHUSETTS

*NORBIDE — Trade-mark Reg. U. S. Pat. Off.



Proof that you ought to figure parts costs in ALCOA ALUMINUM

Before he switched to Alcoa Aluminum 11S-T3 Screw Machine Stock for most of the parts of this insecticide spray gun, the manufacturer had made the gun almost entirely of brass.

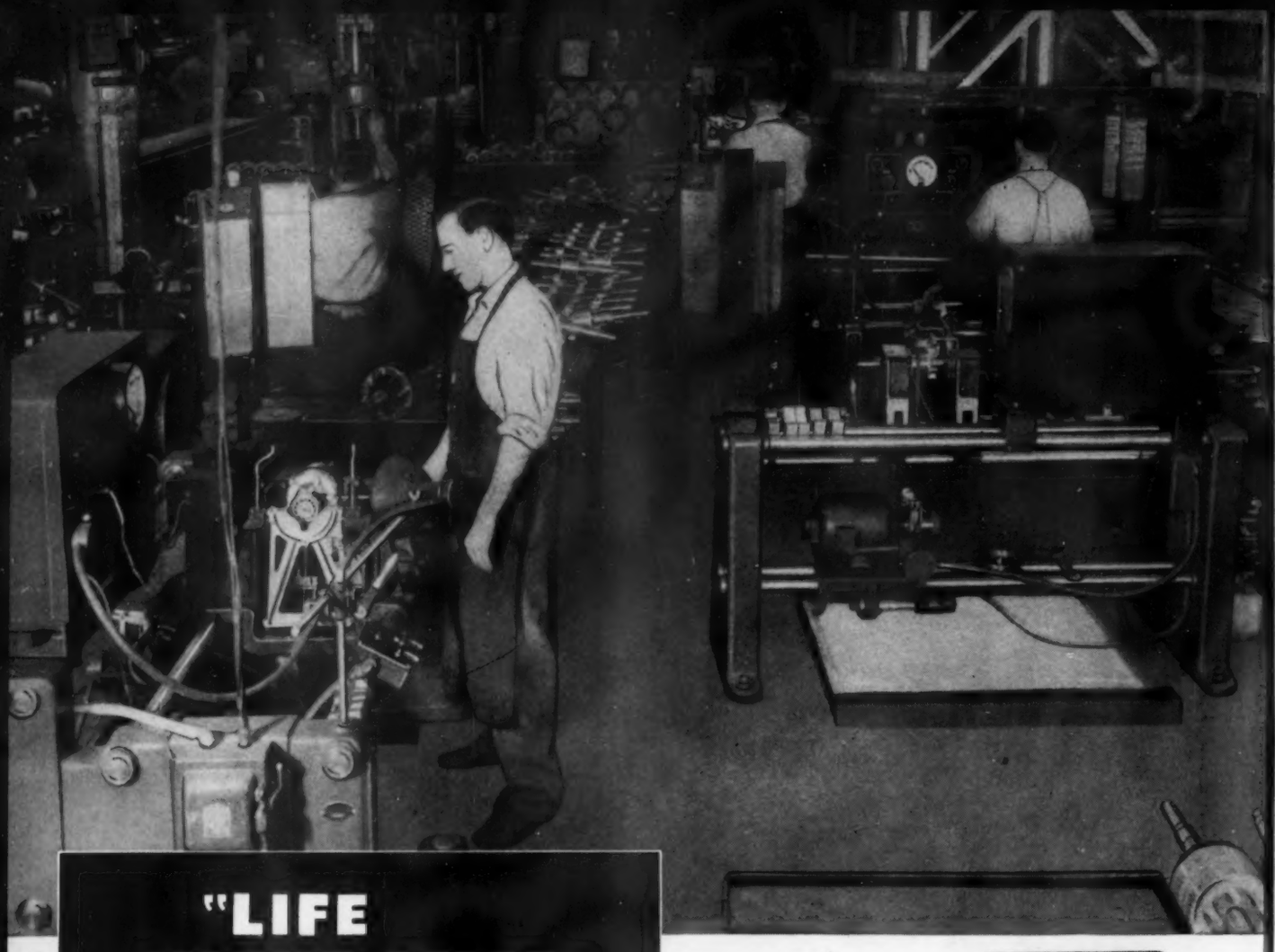
The tag on each of the aluminum screw machine parts shows the total saving on that part by switching from brass and cadmium plated steel to Alcoa Aluminum. He uses Alcoa 11S-T3, the screw machine alloy that will permit you to make similar savings.

Note the savings on parts. Then let us give you further information on Alcoa 11S-T3. Write to ALUMINUM COMPANY OF AMERICA, 2107 Gulf Bldg., Pittsburgh 19, Pa. Sales offices in leading cities.

MORE people want MORE aluminum for MORE uses than ever

ALCOA FIRST IN ALUMINUM

IN EVERY COMMERCIAL FORM



"LIFE INSURANCE"

for electric motors

Gisholt DYNETRIC* Balancing Machines† increase the life expectancy of electric motors by eliminating the most common cause of failure—*vibration.*

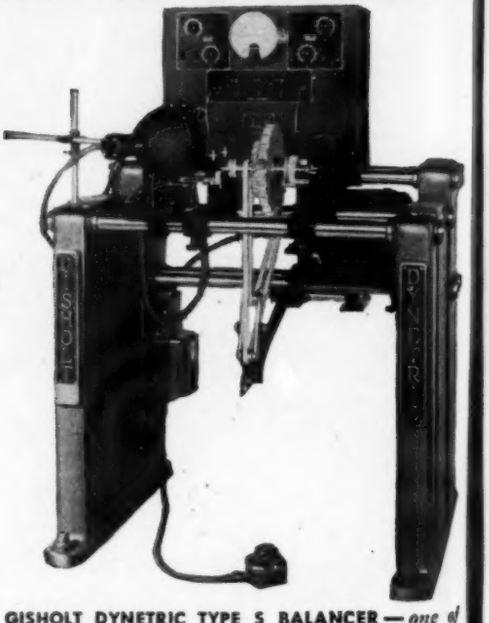
But they do more than that—they insure smoother, more efficient performance. No matter what the job may be, they do a better job. That's important—not only from the user's standpoint but from the manufacturer's as well.

Balancing Departments, like that pictured above, handle this work quickly and economically when they are equipped with Gisholt DYNETRIC Balancing Machines. They put balancing on a mass production basis. And they provide a degree of accuracy which cannot be equaled by any other means.

GISHOLT MACHINE COMPANY
Madison 3, Wisconsin

*DYNETRIC is a Trade-mark Reg. U. S. Pat. Off. by Westinghouse Electric Corporation.

†Developed jointly with Westinghouse Electric Corporation.



GISHOLT DYNETRIC TYPE S BALANCER—*one of many sizes and types available to handle parts from a fraction of an ounce up to many tons. Locating and measuring unbalance requires but a matter of seconds. Where practical, correction equipment can be included as a part of the machine. Write for complete details.*

TURRET LATHES • AUTOMATIC LATHES
SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing, and balancing of round and partly-round parts. Your problems are welcomed here.*

How to keep a center drive on center

WHEN a center drive is mounted on Timken tapered roller bearings you know you've got precision — and can *keep* it.

Timken bearings hold spindles rigid—carry the weight of the work and keep it revolving accurately. Their tapered construction permits accurate preloading to any desired degree and carries radial and thrust loads without deflection or end-movement.

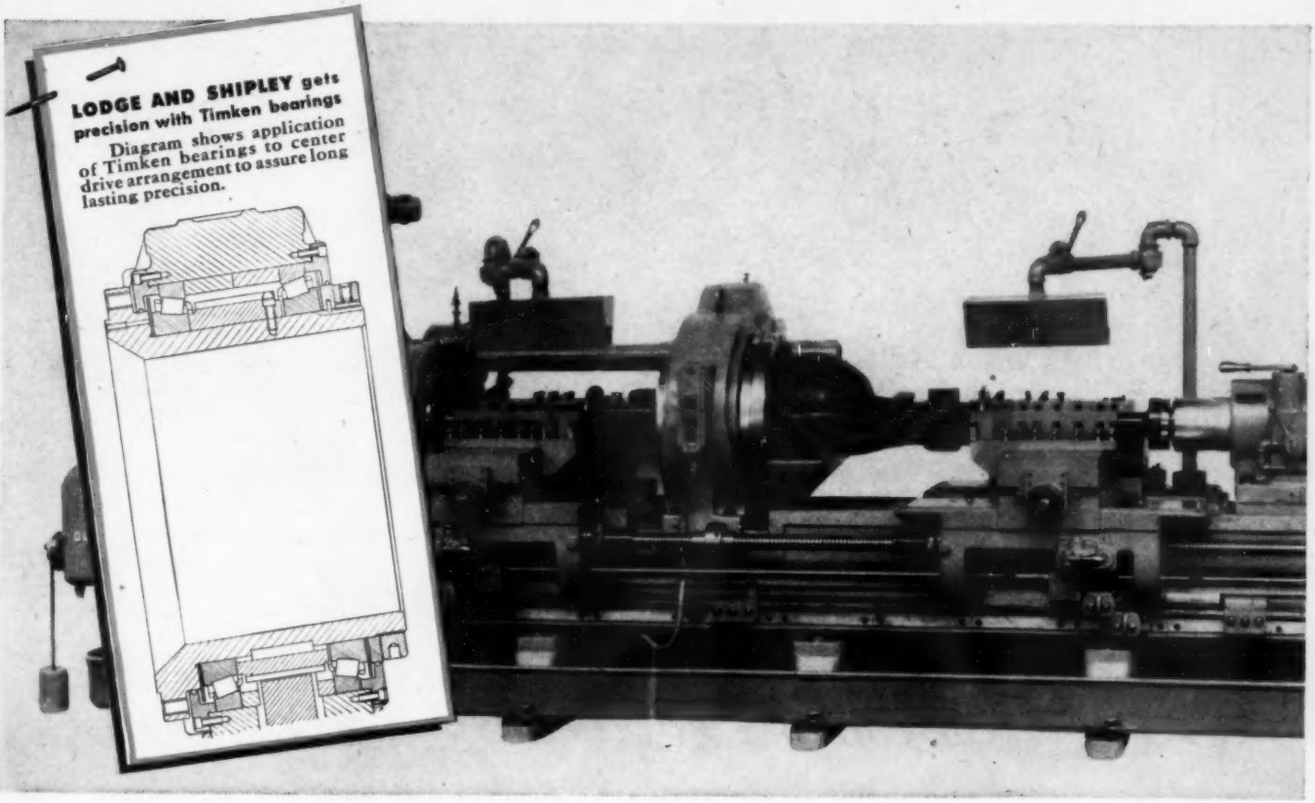
The rolls and races of Timken bearings are made of Timken fine alloy steel—hardened to give you a combination of load-carrying toughness and wear-resisting hardness. The line contact between rolls and races distributes the load over a wide area; greater loads can be carried with practically no wear.

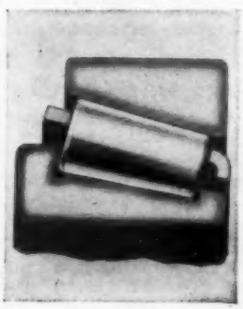
Because Timken bearings are manufactured to extreme precision, and finished to almost incredible smoothness, friction is eliminated.

Remember, no other bearing can bring you *all* the advantages you get with Timken tapered roller bearings—backed by 49 years of bearing research and development. Be sure you have them in the machine tools you buy or build. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN BEARING EQUIPPED

This symbol on a product means its bearings are the best.


LODGE AND SHIPLEY gets precision with Timken bearings
Diagram shows application of Timken bearings to center drive arrangement to assure long lasting precision.



GREATER LOAD AREA

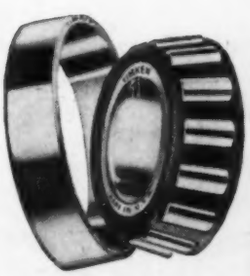
Because the load is carried on the *line* of contact between roller and race, Timken bearings carry greater loads, stand up under shock, hold shafts in line, wear longer.

The Timken Roller Bearing Company is the only bearing manufacturer in the country which makes its own steel, and leads in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.

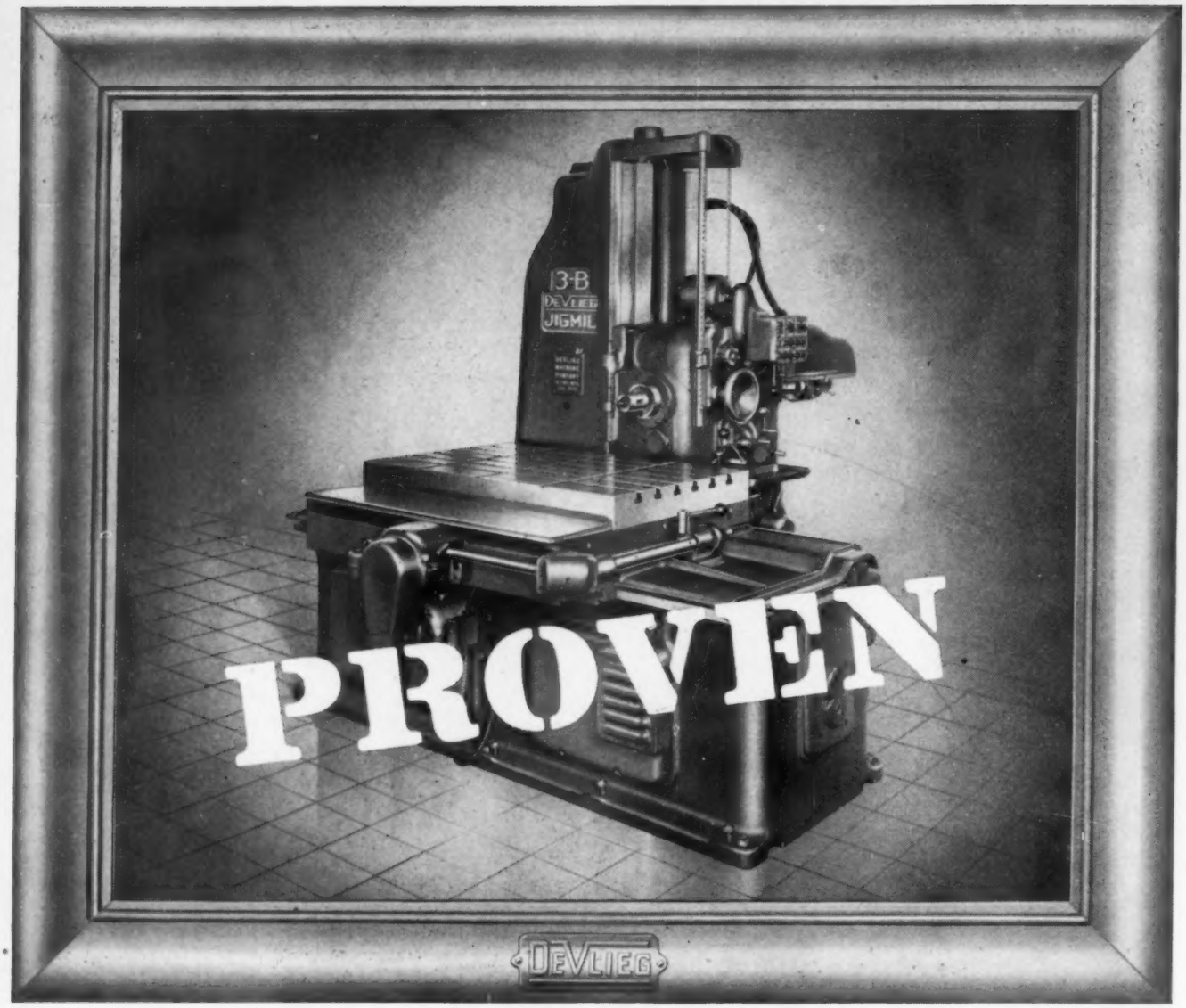
TIMKEN

TRADE MARK REG. U.S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST ⟷ LOADS OR ANY COMBINATION



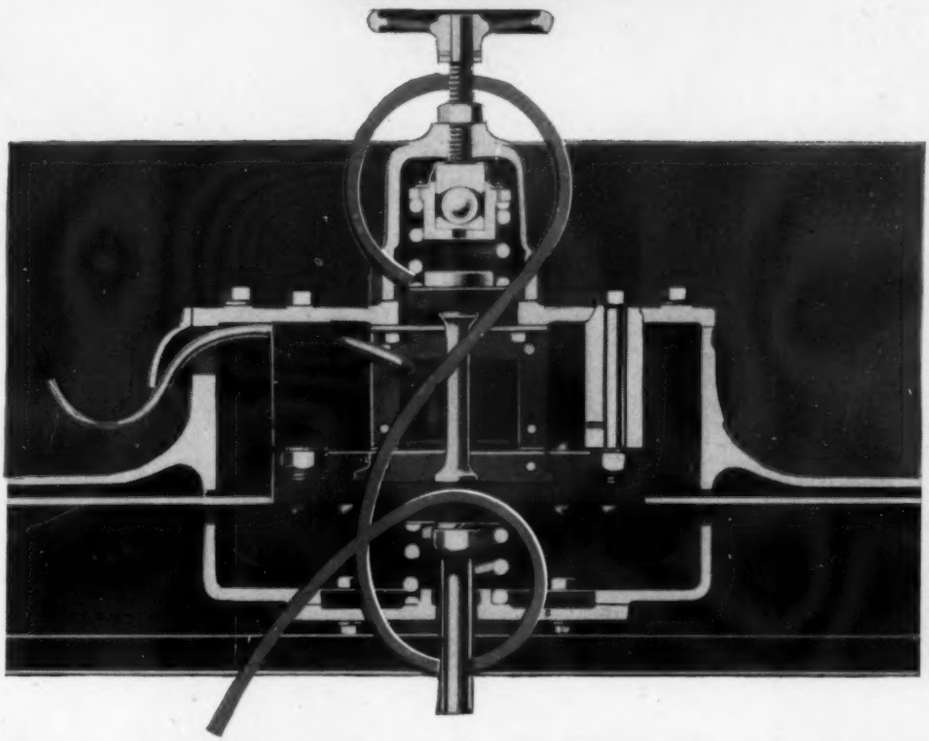
The World's Finest Boring and Milling Machine

THIS new model 3-B JIGMIL has automatic power means to position the spindle from one location to another accurately to within much less than .0001 (one-ten thousandths part of an inch). Thus, extreme laboratory accuracy is conveniently available with ordinary skill that would normally make such precision very high in cost. This, and many other refinements, go further to prove that the JIGMIL idea is a totally new approach to the problems of precision boring at a new low cost.

DeVLIEG MACHINE COMPANY DEVLIEG JIGMIL **450 FAIR AVE. FERNDALE 20, (Detroit) MICH.**

YEAR IN-YEAR OUT

1800 to 3600 Vibrations a minute!



The HUM-MER SCREEN, made by the W. S. Tyler Company of Cleveland, Ohio, successfully screens everything from explosives to women's face powder. Its screen mechanism vibrates 30 to 60 times a second. Two of the important springs in this machine are U·S·S American Quality Springs . . . and even under this severe punishment, they last years without replacement.

That calls for quality springs!

● 1800 to 3600 vibrations a minute is a real test for any spring. Yet in the electrically vibrated mechanism of this screening machine, U·S·S American Quality Springs last years without replacement!

Under equally severe conditions, precision-made American Springs manufactured to close tolerances are giving faithful, economical performance in hundreds of other applications.

These springs are constantly being improved to keep pace with the increasingly severe demands made on them by today's machine developments. Our staff keeps abreast of all metallurgical advances, of every improvement in spring steel . . . and incorporates them without delay in U·S·S American Spring design.

Bring your spring problem to us, whether you buy your springs ready-made or make them yourself. Our experts will see to it that you are supplied either with exactly the right springs for your job, or with the best spring wire obtainable for making your own springs.

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

Columbia Steel Company, San Francisco,
Pacific Coast Distributors

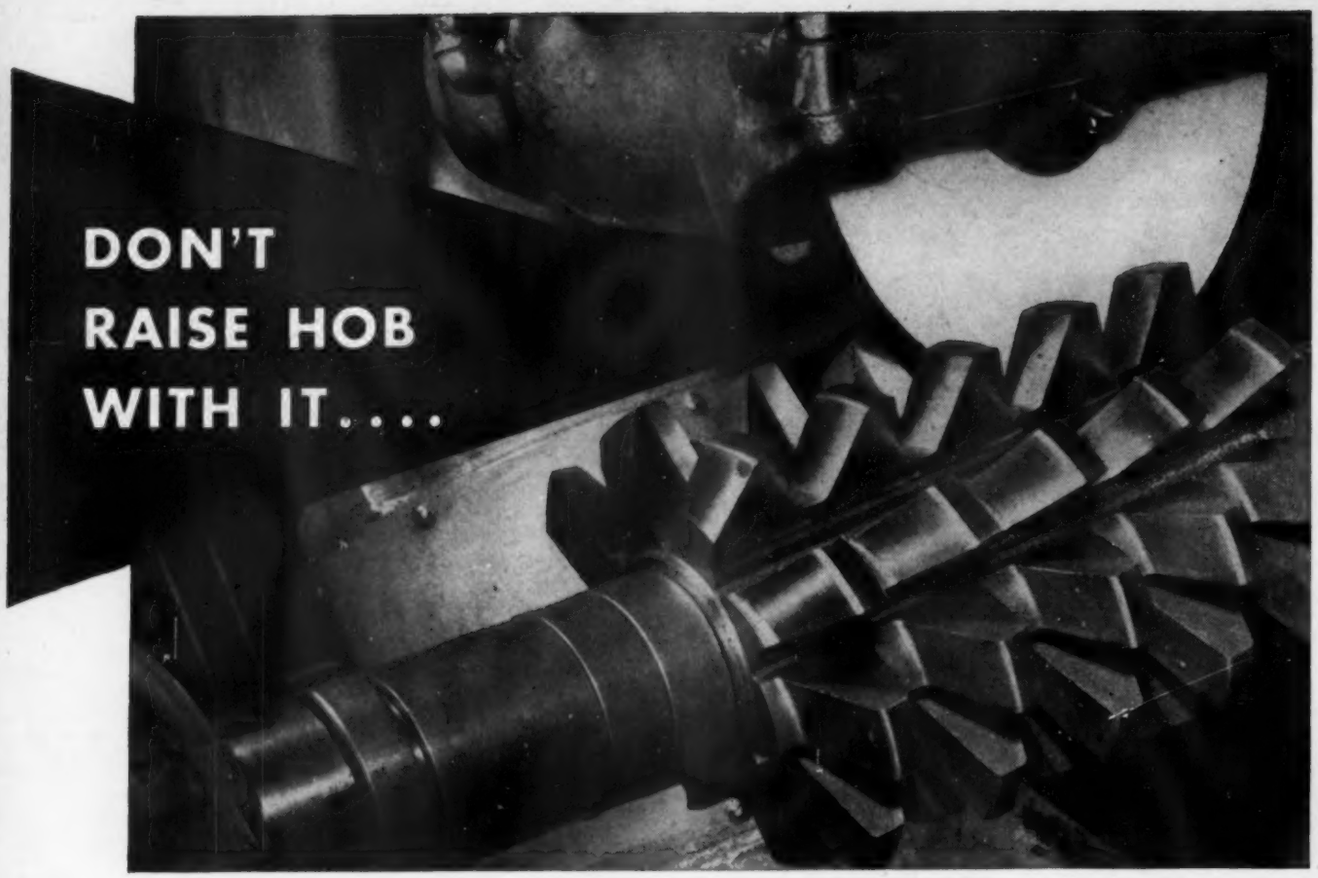
Tennessee Coal, Iron & Railroad Company, Birmingham,
Southern Distributors

United States Steel Export Company, New York

UNITED STATES STEEL

AMERICAN STEEL & WIRE COMPANY · USS · AMERICAN SPRINGS · UNITED STATES STEEL

U·S·S American Quality Springs



Use a ROBERTSON *Cool-Cut Wheel*

Grinding hobs, a tedious, time-consuming operation at best, becomes comparatively easy when you use a Robertson Cool-Cut Wheel. *Chip clearance?* The "open" structure of this revolutionary wheel allows more than adequate space for chip clearance! This means fast and cool grinding of hobs of any size, of the hardest steel.

Large hobs with 1½" or greater pitch may be successfully ground with a 10"x1"x1" WA46-J2V Robertson Wheel. On smaller hobs, a Robertson 7"x⅝"x¾" RA60-J2V will give highly satisfactory results. There will be no burning and very little heat generated. Experience has shown that you can expect a 50%, or greater, saving in grinding time when you use a Robertson Cool-Cut instead of a conventional wheel.

For faster and more accurate tool-grinding of any kind, make sure your grinding wheels are Robertson Cool-Cuts . . . the wheels that are precision-built for the toughest jobs. Write for your free copy of the pocket booklet "How to Buy Production Time," which tells you all about Robertson Wheels.

ROBERTSON MANUFACTURING COMPANY
TRENTON 5, NEW JERSEY

Manufacturers of Vitrified-Bonded Grinding Wheels • Mounted Wheels • Segments

and what about your CUTTING FLUID?

A "RIPE" TANKFUL can cause a lot of misery in your metal working shop. But such bad smells are something you don't have to worry about when you use Cimcool. This revolutionary new cutting fluid is a *chemical emulsion.* Therefore, it's not subject to rancidity even in the hottest weather. Add to this the fact that Cimcool can't smoke or burn and has no objectionable odor of its own and you'll see why operators swear by it whenever it's used.

CLEAN AIR is only PART of the Story

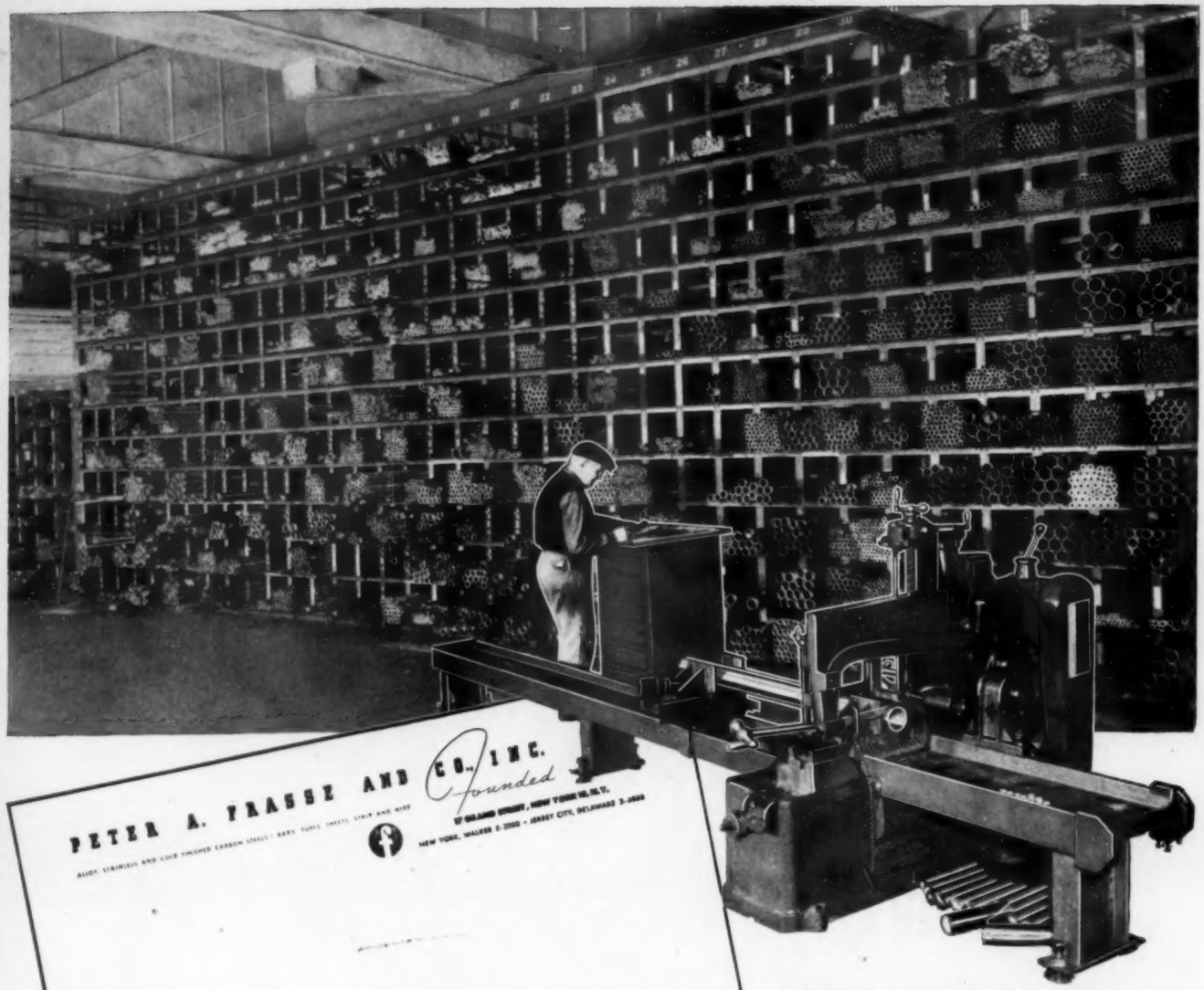
- Cimcool cools faster — allows faster cutting speeds and feeds.
- Uniform temperature of work and machine increases accuracy.
- No fire hazard — No slippery film.
- No chromates or other skin irritants.
- Contains long lasting rust inhibitor.
- Chemical lubricity increases tool life.
- Covers 85% of all metal working jobs.

CIMCOOL

THE MULTI-PURPOSE CUTTING FLUID

Trade Mark Reg. U. S. Pat. Off.

CIMCOOL DIVISION of THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO, U. S. A.



PETER A. FRASSE AND CO., INC.

Founded

Armstrong-Blum Mfg. Co.
5700 Bloomingdale Avenue
Chicago 39, Illinois

Gentlemen:

We are very satisfied with the performance of the new 6A and 9A Marvel Heavy-Duty Automatic Hack Saw Machines recently installed in our warehouses. Our decision to purchase these new Marvel saws was based on the satisfactory performance we have been receiving for the past 10 years from our original Marvel machines.

In our business of warehouse distribution of carbon, alloy and stainless steel bars and tubes, we are called upon to make accurate cut lengths for customers, and on numerous occasions handle orders for hundreds and sometimes thousands of multiple cut pieces. Our Marvel saws help us to rapidly and efficiently handle such sawing requirements.

Marvel saws and high-speed edge hack saw blades are giving satisfactory performance in all our warehouses, and your service has been most cooperative.

Very truly yours,

PETER A. FRASSE AND CO., INC.

W. E. Davis
Assistant Vice President

WED/amc

MARVEL Saws Speed-up Deliveries

You will get cut-off lengths in any quantity faster from the steel warehouses and stockrooms that are equipped with MARVEL 6A and 9A Automatic Hack Saws. Far faster, floor to floor, than any other hack saws, they save valuable machine hours by reducing cutting-off time to a fraction,—save other machining hours by producing accurately cut pieces of exact length.

1947 MACHINE TOOL SHOW
CHICAGO
SEPT 17-26

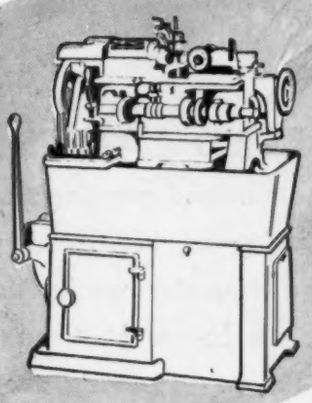
ARMSTRONG-BLUM MFG. COMPANY
"The Hack Saw People"
5700 BLOOMINGDALE AVENUE CHICAGO 39, U. S. A.

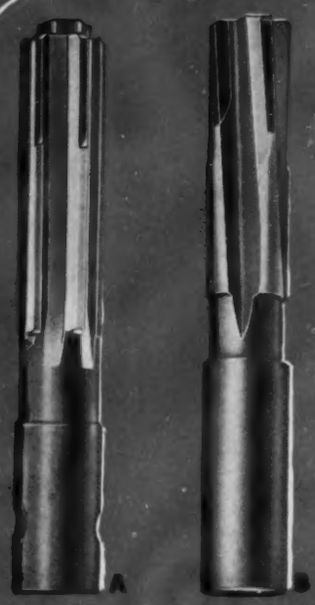
MARVEL Metal Cutting SAWS

Better Machines-Better Blades

TOP PRODUCTION TEAM

for HIGH Accuracy and LONG Runs





AUTOMATIC SCREW MACHINES *PLUS* **Staples CARBOLOY-TIPPED** CEMENTED CARBIDES **STUB SCREW MACHINE REAMERS**

Staples stub screw machine reamers cut production costs on automatic screw machine operations by eliminating frequent down time for reamer sharpening. Carboloy surfaces are highly resistant to wear—far exceed H.S.S. on tool life. Tools hold accurate diameters, permitting long runs on exceptionally close tolerance work.

These reamers are made both in solid and expansion types. Tools are stocked semi-finished and are ground to size specified with tolerance of .0003″ on diameter. A complete range of sizes is available for immediate delivery.

(A) Staples Carboloy - tipped Expansion Stub Screw Machine Reamer.

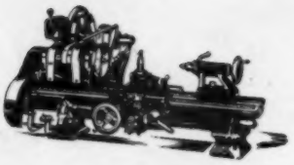
Staples patented expansion principle permits easy adjustment of tool to .0001″. Expansion plug limited to $^{3}/_{32}$″ extension beyond tool end (width of cut-off blade) eliminates possibility of plug striking bottom of drilled hole. Can also be furnished with plug flush with tool end if specified.

(B) Staples Carboloy - tipped Solid Stub Screw Machine Reamer.

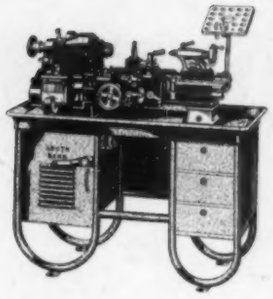
THE STAPLES TOOL COMPANY
CINCINNATI 25, OHIO
Distributors in Major Cities

Staples CARBOLOY-TIPPED CIRCULAR CUTTING TOOLS

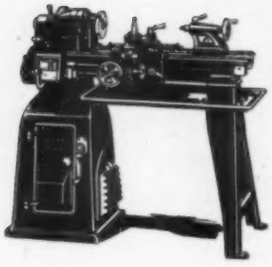
REAMERS • CORE DRILLS • SPOT FACERS • COUNTERBORES • END MILLS • SHELL END MILLS • ALSO A COMPLETE LINE OF CIRCULAR SPECIAL TOOLS



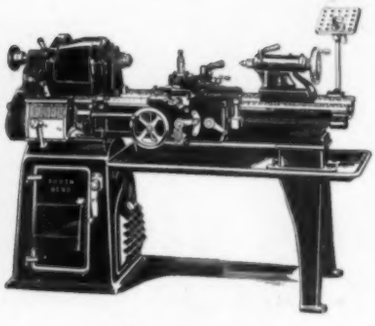
9" Model A Bench Lathe
$270



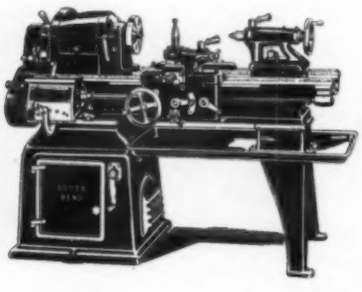
10" Toolroom Bench Lathe
$1039



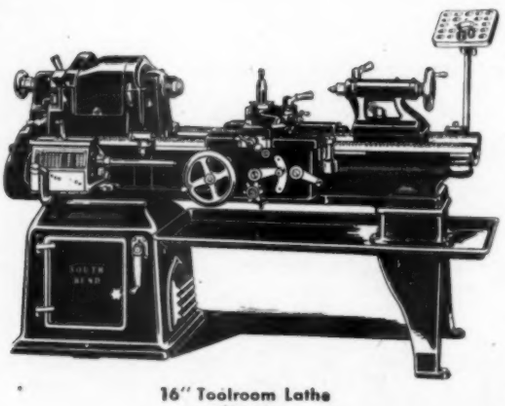
10" Quick Change Gear Lathe
$718



13" Toolroom Lathe
$1418



14½" Quick Change Gear Lathe
$1309



16" Toolroom Lathe
$1958

SOUTH BEND LATHES for accurate production operations and exacting toolroom work. Six sizes available — as illustrated, plus 16/24" swing for large diameter work. Also, Precision Turret Lathes with ½" and 1" maximum collet capacities; 9", 10", or 16" swing over bed.

DELIVERY—See your local distributor today for immediate delivery from his stock or early delivery from factory.

PRICES—Start at $145.00, f. o. b. factory. Average increase is less than 15 per cent over prewar price level.

TIME PAYMENTS—South Bend Lathes available on terms of 25% down, 12 mo. to pay. Moderate finance charge.

See your South Bend distributor today!

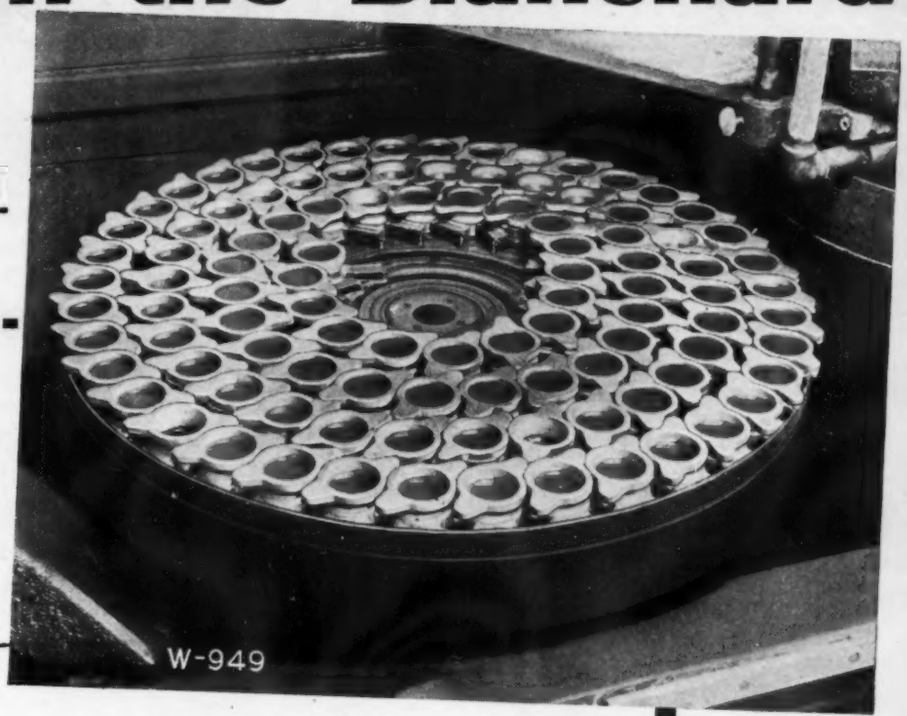
SOUTH BEND
REG. U.S. PAT. OFF. & OTHER COUNTRIES

SOUTH BEND LATHE WORKS

BUILDING BETTER LATHES SINCE 1906 • 419 E. MADISON ST., SOUTH BEND 22, INDIANA

Put it on the Blanchard

A CHUCKFULL of production-at-a-profit!



THE JOB:

Part: HOSE COUPLING

Pieces per hr.: 200

Surfaces per hr.: 400

No. of sides ground: 2

No. on chuck: 102

Material: Cast Iron

Stock removal per side: 3/32 to 1/8"

Limits: Clean up (rough-cast surfaces)

THE MACHINE: No. 18 Blanchard Surface Grinder

Chuck: 36"

Chuck Speed: 12 RPM

Feed: .032" per min. on first side; .016" per min. on second side

Here's visual evidence of both the simplicity and productivity of the Blanchard Method of producing flat surfaces from the rough castings—*at a profit.*

The hose couplings are simply and quickly placed on the magnetic chuck for maximum utilization of the chuck surface. The blocking pieces are quickly placed along the inside circumference, against the parts.

And you're all ready to remove metal—easily, quickly and safely—without operational strain and fatigue—*by the most efficient method of producing flat surfaces ever invented.*

Most Blanchards give more than 25 years of useful, productive and profitable service.

Our engineers—with more than thirty years' experience in grinding flat surfaces—will welcome your flat-surface-production problem. Simply send us the data—including prints and samples, if practicable. Blanchard Consultation Service and Sample Grinding is free and in no way obligates you.

Send for your free copy of "Work Done on the Blanchard", third edition. This new book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

BLANCHARD

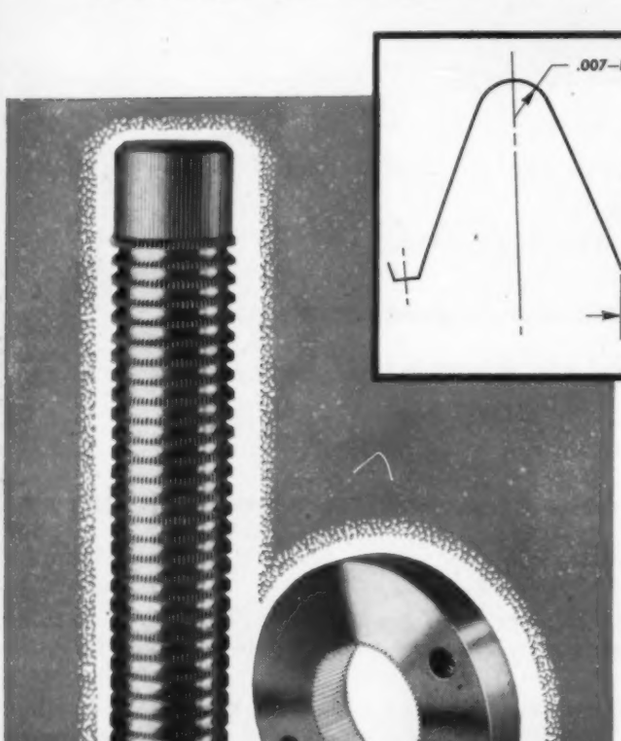
The BLANCHARD MACHINE COMPANY

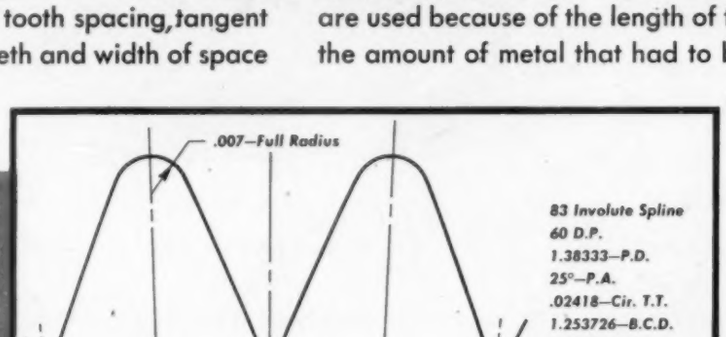
64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

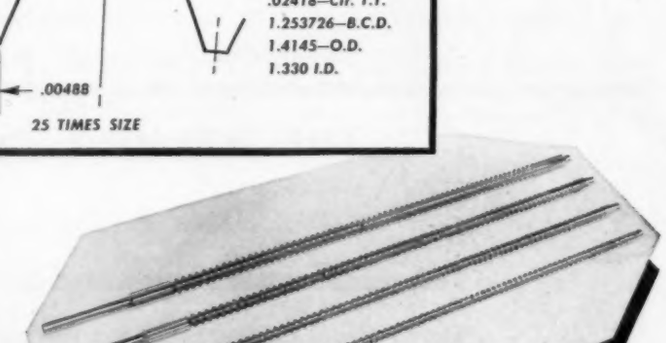
ART AND SCIENCE *Unite* IN MAKING *SUCCESSFUL NALOY BROACHES*

The broach engineer, from long experience, determines the design and the machining cycle in which the broach is to be used. The craftsmen using the most modern equipment put that design into steel.

Here are two highly successful Red Ring broach projects. The first is a fine pitch involute form broach to make the shaving dies for the gear teeth of a camera shutter lever winder. Tolerances on involute form, tooth spacing, tangent radius on top of gear teeth and width of space at minor diameter were held to a tolerance of less than .0002". The second project is a set of broaches used to produce the tooling for a cycloidal gear tooth pump. Here, four broaches are used because of the length of the part and the amount of metal that had to be removed.







Red Ring broach engineers have had 17 years of experience in handling all types of problems. Take advantage of this experience.

2625

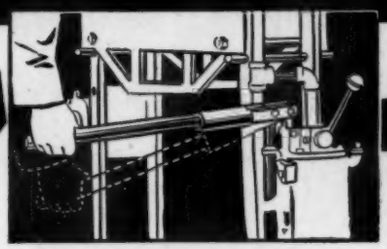
RED RING PRODUCTS

NATIONAL BROACH AND MACHINE CO.

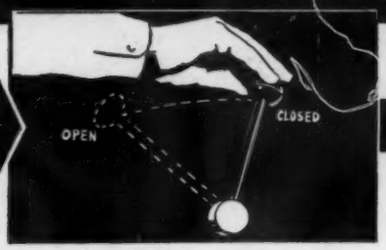
5600 ST. JEAN • DETROIT 13, MICHIGAN

SPECIALISTS ON SPUR AND HELICAL INVOLUTE GEAR PRACTICE • ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORMS

These KRW Hydraulic Arbor Press Features . . .

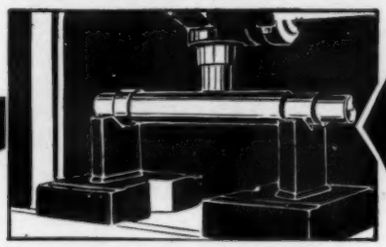


Fast Action, cylinder is filled as ram travels to work. You get tons of pressure with first pump stroke.

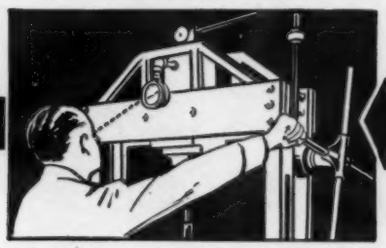


Finger Tip Control opens and closes valve in a jiffy. No gripping effort assures easier, faster operation.

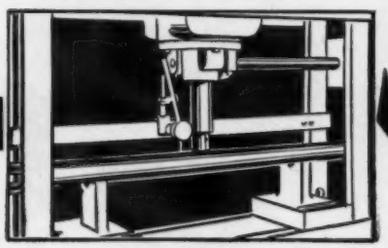
KRW Built-in Mechanical Press permits up to 3 tons pressure for straightening small diameter work.



One Piece, All Steel V-Blocks have machined surfaces for greater accuracy; usable upright or inverted.

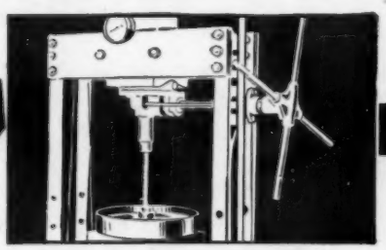


Highly Visible Pressure Gauges are mounted where they can be quickly checked. Read in tons and pounds.

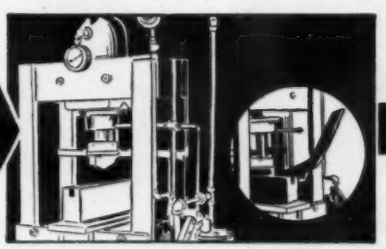


Micrometer Dial Attachment permits great accuracy in checking work without removing from V-block.

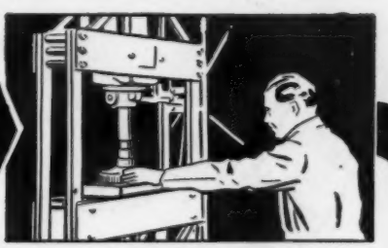
Reduce Costs ON THESE AND OTHER DAILY Production Jobs . . .



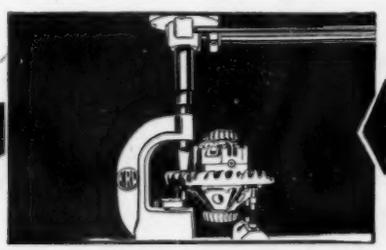
Broaching a key way in a flywheel. 7½ inch ram travel makes many broaching jobs practical on KRW Presses.



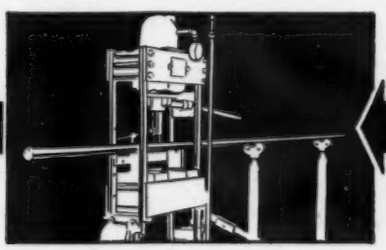
Bending in production lots with simple, inexpensive dies is easily done on low-cost KRW Hand-operated Presses.



Pressing of all types is efficiently handled. Adjustable bed makes pressing on long shafts a very simple operation.



Riveting with KRW Riveting Attachment is simplicity itself. Many KRW Presses are used for this type work.



Straightening, especially on long work, is easy on a KRW Press because of its special open-end construction.

Blanking is easy with simple die set for short-run operations. Releases regular equipment for quantity production.

Write for the **NEW KRW** *Catalog . . . . . .*

K·R·WILSON

215 MAIN STREET, BUFFALO 3, N. Y.

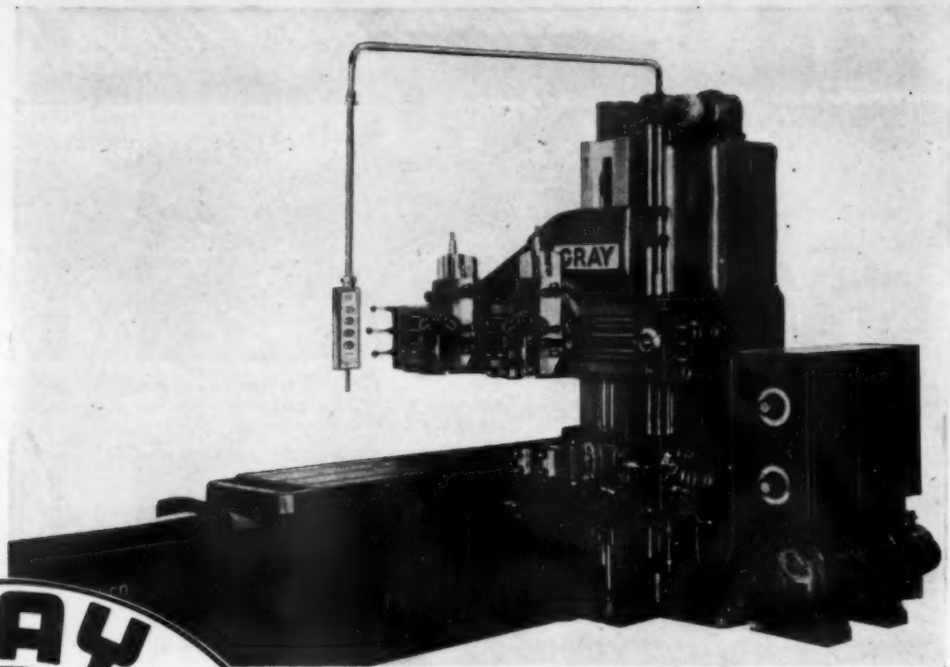
K. R. WILSON, 215-217 Main St., Buffalo 3, N. Y.

Please mail me a copy of your Hydraulic Arbor Press Catalog 11

Name .....

Address .....

City ..... *Zone* ..... *State* .....



GRAY PLANER CUB

He will be at the.. MACHINE TOOL SHOW

When you see the GRAY PLANER CUB in action you will realize why the CUB is a "bear for production"

Write now for fully illustrated descriptive Bulletin No. 55

The G.A. GRAY Company

planers • milling planers
planer type milling machines
horizontal boring machines

CINCINNATI 7, OHIO, U. S. A.

Sold in Canada by Upton, Bradeen and James Ltd. ● Sold in Latin America by Machine Affiliates.

Actually There's NO TRICK to Reducing Milling Costs!

Your milling costs can be cut to a minimum by using Kempsmith Standard Attachments to increase the productiveness of your standard milling machines.

57 years of specialized experience has given Kempsmith the necessary "know-how" to turn out dependable, precision-built Attachments, Arbors and Accessories.

Kempsmith Standard Attachments are made to perform the most delicate milling operations with both speed and accuracy. Why not investigate the cost-saving possibilities of these sturdy, time-proven tools? Write, today, for literature.

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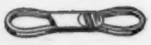
KEMPSMITH

Precision Built Milling Machines Since 1888

A 5154-1P-C

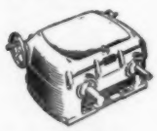
TEXROPE .. Greatest Name in V-Belt Drives



"Super 7" V-BELTS
Five Types — Sizes to suit every power transmission job.

Texsteel, Texdrive, "Magic-Grip"
— sheaves in a full range of sizes, grooves.

"Vari-Pitch" SHEAVES
Exact variations in speed, stationery or motion control.



SPEED CHANGERS
Speed variations up to 375% at the turn of a crank.

ENGINEERING
Finest V-Belt engineering talent in the world—at your call.

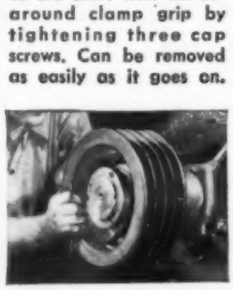
TEXROPE "Super 7" V-Belts result from the cooperative research of two great companies — Allis-Chalmers and B. F. Goodrich. They are sold only by A-C.

Save time . . . prevent damage to motor and shaft . . . with TEXROPE

"MAGIC-GRIP" SHEAVES

QUICKLY ALIGNED
Because it slides freely on the shaft, it's easy to line up the sheave accurately — for good alignment, smooth operating, longer belt life. It pays to standardize on "Magic-Grip" sheaves.
See Sweet's Catalog

SLIPS ON EASILY
Comes completely assembled. Tapered split bushing provides clearance for even over-size shafts — it's compressed and locked to the shaft with an all-around clamp grip by tightening three cap screws. Can be removed as easily as it goes on.



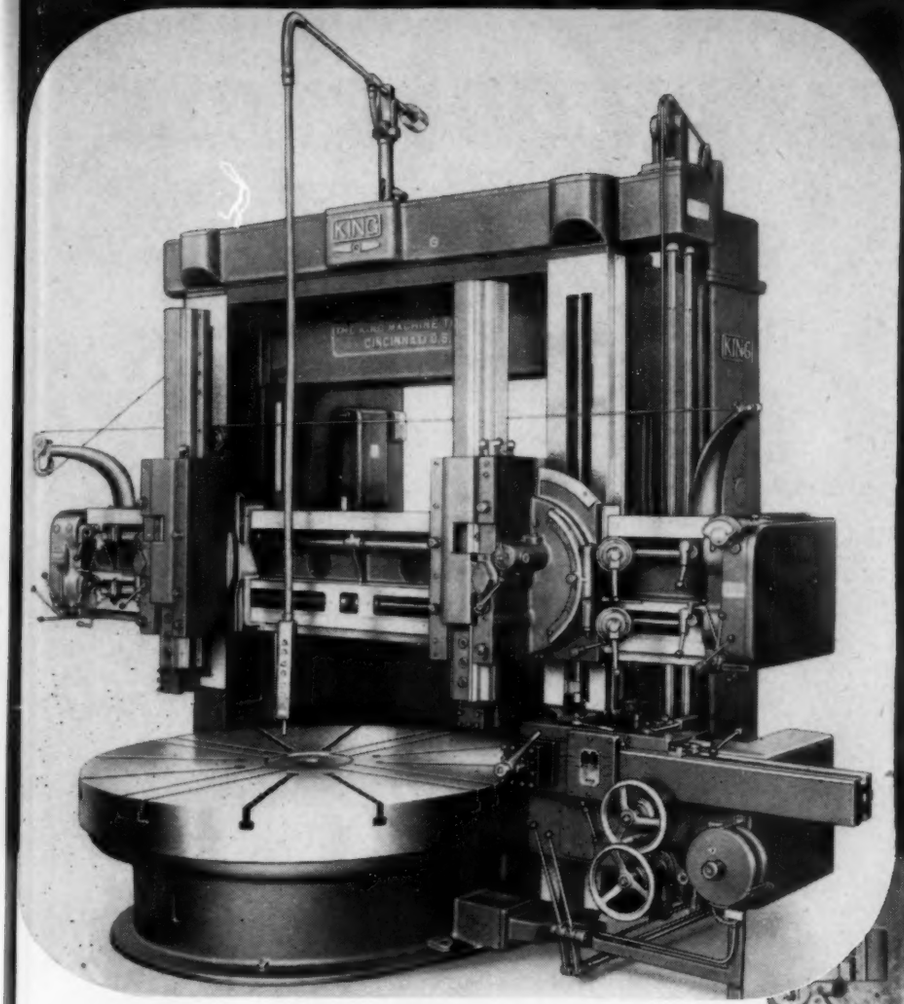
HERE'S A SHEAVE that goes on *fast*. Less labor cost — less downtime. But that's only part of the saving. There's no forcing or hammering to damage motor bearings — no set screws to mar the shaft. Locks on with a powerful clamp grip that prevents backlash or wobble. And . . . it costs no more than a standard heavy duty sheave of comparable materials and precision workmanship.

Texrope "Magic-Grip" sheaves are made in diameters from 5.4 to 48 inches, two to 12 grooves. They're engineered by Allis-Chalmers, originators of the multiple V-belt drive. For specifications, prices, call your nearest A-C dealer or office. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN. A 2221

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

1847 1947
A CENTURY OF SERVICE to Industry THAT MADE America Great



For your tough jobs large or small

★

The **NEW** *Series*

KING

● Whether the job is large enough to take the full swing of the machine or merely a small job it can be handled economically on the new KING.

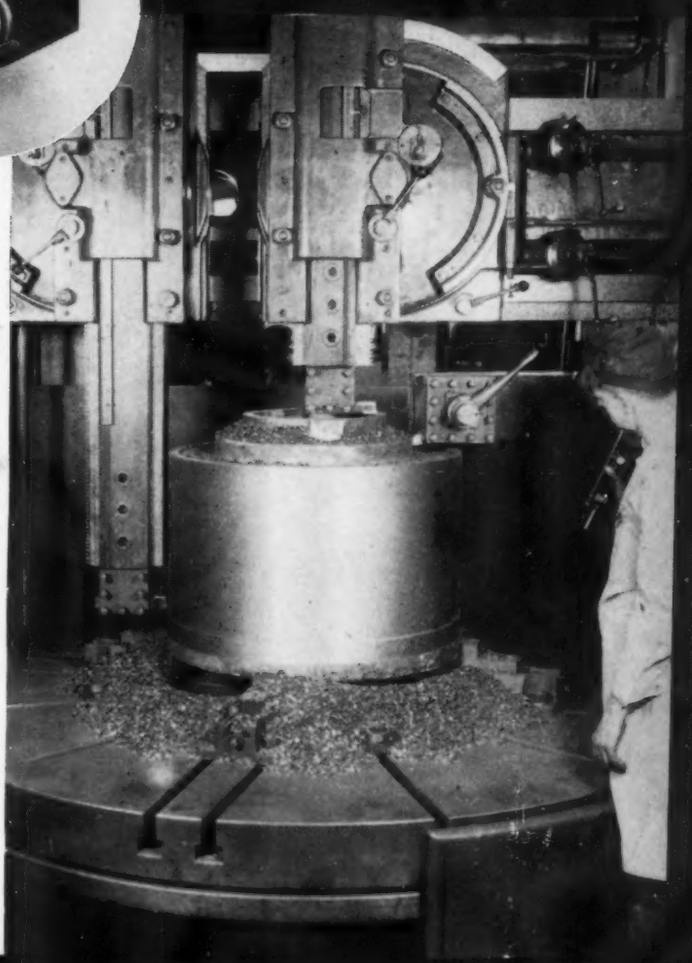
This new series vertical boring and turning machine has considerably more weight—new rectangular type rams—saddle for ram head square locked and fitted with four tapered gibs for adjustment—a heavy tie plate across the swivel and other construction points that assure greater rigidity, strength and accuracy.

Illustrated at the right is a 30" diameter drum on a large machine which is being turned on two diameters and faced at one time—all three heads operating simultaneously on the work. This is only one of many ways in which this new series King can be used to advantage regardless of the size of the work.

On your turning, boring and facing work requiring greater production and lower costs to meet competitive conditions investigate the new series KING.

Available in ten sizes from 30" to 144".

WRITE FOR DETAILS.



THE KING MACHINE TOOL COMPANY

CINCINNATI 29, OHIO

Builders of Vertical Boring and Turning Machines and Sebastian Lathes

REACH PEAK PRODUCTION

with the Versatile, Efficient

COVEL NO. 15 SURFACE GRINDER

Immediate Deliveries

Proved in tool-room and on production line, this 6" x 18", hand feed surface grinder combines up-to-the-minute improvements in grinding machinery — and high standards of craftsmanship — to furnish you with a tool that will help lower costs and increase output. The No. 15 is one of the COVEL line of precision machine tools which includes: universal cutter and tool grinders, twist drill grinders, boring machines and precision vises.

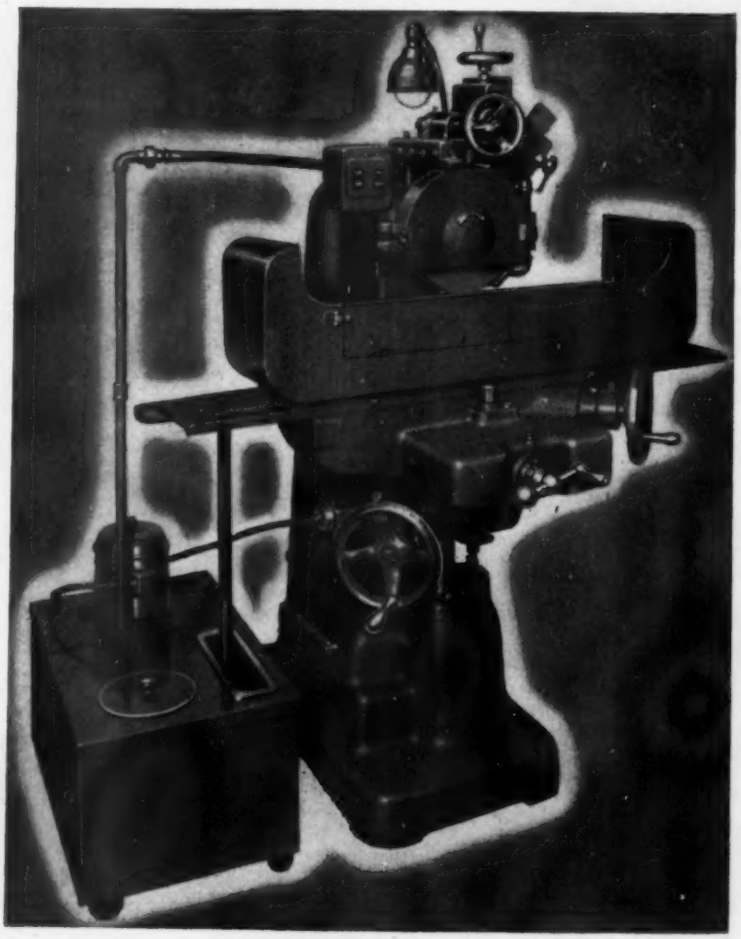
Call your nearest dealer or write for Bulletin A-177

COMPARE THESE ADVANTAGES

- ★ 1½ H.P. MOTOR
- ★ 10" x ¾" WHEEL
- ★ THREE SELECTIVE SPEEDS
- ★ BUILT-IN WHEEL TRUING DEVICE
- ★ RIGHT HAND TABLE OPERATION
- ★ CONVENIENT ELEVATION CONTROL

SEND FOR NEW BULLETIN DESCRIBING LATEST IMPROVEMENTS ON THE NO. 15

SEE THIS AND OTHER COVEL MACHINES AT BOOTH 636 MACHINE TOOL SHOW



COVEL MANUFACTURING CO.
BENTON HARBOR, MICHIGAN, U.S.A.

COVEL
INDUSTRIAL GRINDERS

MAKE 1947 PRODUCTS ON 1947 PRESSES

1947 Product manufacture—of automobiles, washing machines, refrigerators, electric ironers—hundreds of other items for the home, shop, store and office—has become, in the main, *a matter of Stamping or Press Production.*

Consequently, the problem of greater and cheaper production of these items depends largely on improving techniques and facilities for *greater production with presses.*

The Danly Press has been designed for complete utility—designed to keep pace with the sweep of progress demonstrated in the streamlined products of 1947.

The machine tool accuracy of Danly Presses gives smoother performance, quiet operation and minimum wear—makes for faster runs, more accurate stampings, longer die life, less downtime and *greater production.*

Gears and driving members built within the crown keep out dust and other foreign material . . . Modern enclosed construction and the absence of outboard machinery promote safety, make for a neat appearance—especially in rows or batteries.

A rugged Danly Air-Friction Clutch and a Circulatory pump driven oil spray lubrication system are featured in the Danly Press.

Investigate Danly's complete line of 1, 2 and 4 point single, and double action Straight-Side Presses, and Horning, Inclinable and Gap-Frame Presses. They will put the same efficiency into your *production facilities* that you have put into your *product.*

MAKE 1947 PRODUCTS ON 1947 PRESSES

DANLY MACHINE SPECIALTIES, INC.

2100 South 52nd Avenue • Chicago 50, Illinois

1000-TON STRAIGHT-SIDE PRESS

This precision built 4-point Single Action Press has the clean lines, the completely enclosed construction that typify the Danly line. Readily accessible from all four sides, loading and unloading this press is not hampered by external supports or machinery. The bed is machined to receive air cushions.

DANLY . . THE PRESS FOR MODERN PRODUCTION

Now—MULTIPLY the UTILITY of SURFACE GRINDERS

Gain cylindrical grinding facilities with NEW No. 616 ATTACHMENT

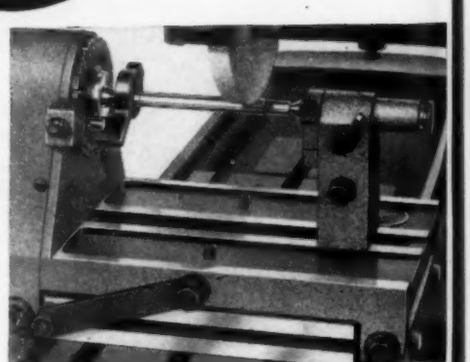
...We urge buying through the Distributor

● For dry grinding small cylindrical work, tapers and work requiring indexing, the new Brown & Sharpe Cylindrical Grinding and Indexing Attachment extends the usefulness of surface grinders. It saves time and expense and often makes unnecessary the installation of extra cylindrical grinding equipment.

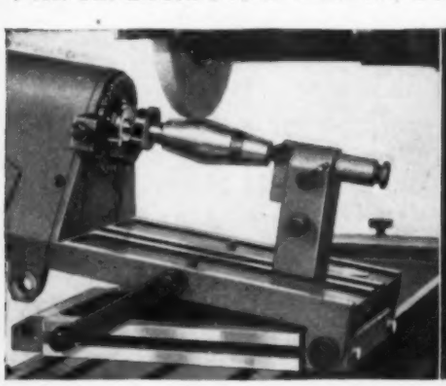
Straight cylindrical or tapered work is ground between centers or if ½″ diameter or less, can be held in the indexing spring chuck. Indexing is performed with headstock index plate or with interchangeable indexing spring chuck.

Centers swing 6″ diameter, take work 5¼″ in length. Maximum grinding angle, 45°. 1/60 H.P., 115 V., A. C. motor is completely enclosed. Write for illustrated folder about the new time-and-money saving No. 616 Cylindrical Grinding and Indexing Attachment. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

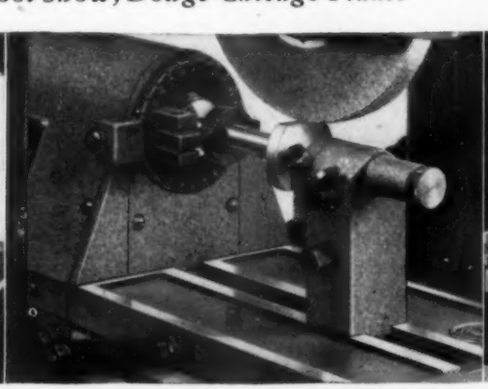
Visit our Booth 505 at Machine Tool Show, Dodge-Chicago Plant.



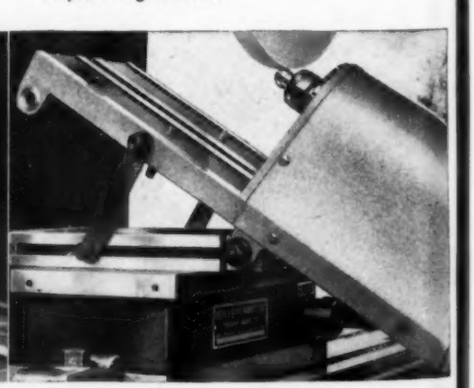
● Grinding work held between centers. Tailstock center is withdrawn for work change by simple swing of lever.



● Grinding taper shank. Attachment is adjustable to the desired taper.



● Grinding parallel flats using index plate. Index plate has 24 slots and is locked or released by plunger.



● Angular grinding of work held in spring collet. Attachment is held on permanent magnet chuck.

BROWN & SHARPE B·S

Always specify **CLE-FORGE HIGH SPEED DRILLS**

TRADE MARK REG. U.S. PAT. OFF.

...for PRECISION DRILLING at PRODUCTION SPEEDS

Telephone your INDUSTRIAL SUPPLY DISTRIBUTOR

With CLE-FORGE High Speed Drills you get smooth, accurate holes at maximum speed with the least amount of "down" time. They are both forged and milled, thereby incorporating into one tool both the toughness of the forged type and the accuracy of the milled type. For more than a quarter of a century CLE-FORGE High Speed Drills have earned a reputation for producing *more holes per grind.*

The CLEVELAND TWIST DRILL COMPANY
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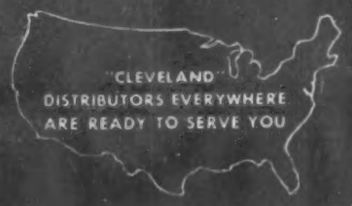
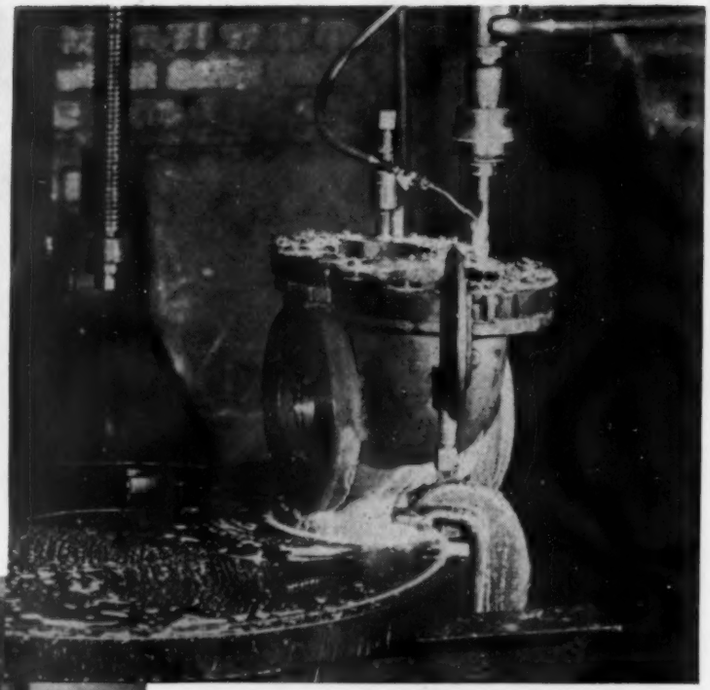
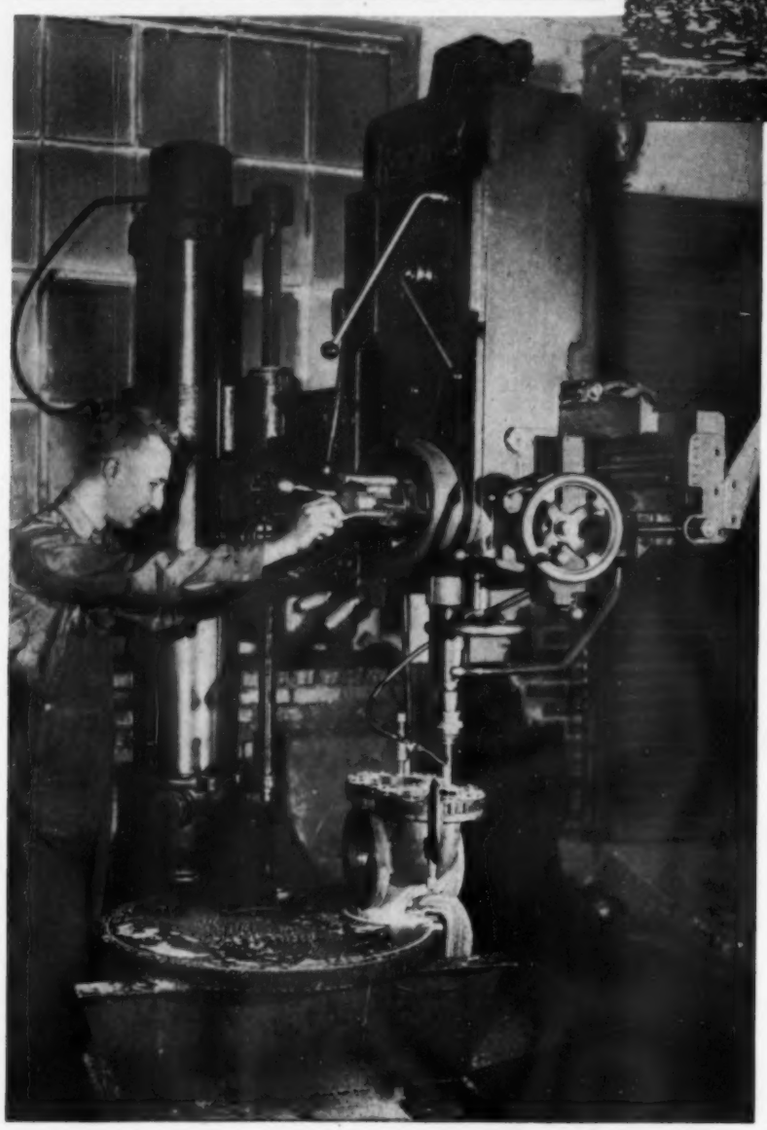


FOSDICK RADIAL

speeds-up production of steel valve bodies





● Illustrated in a typical Fosdick Radial installation. The machine is drilling several holes in flange of valve bodies at one setting. Note the use of drill jig to facilitate locating holes in flange.

The complete hydraulic control of the Fosdick Radial simplifies mechanical mechanism and produces ease of movement. Variable rapid traverse to the head assists in locating the drill with little effort on the part of the operator and provides a distinct advantage on this job where several holes are drilled at one setting of the work.

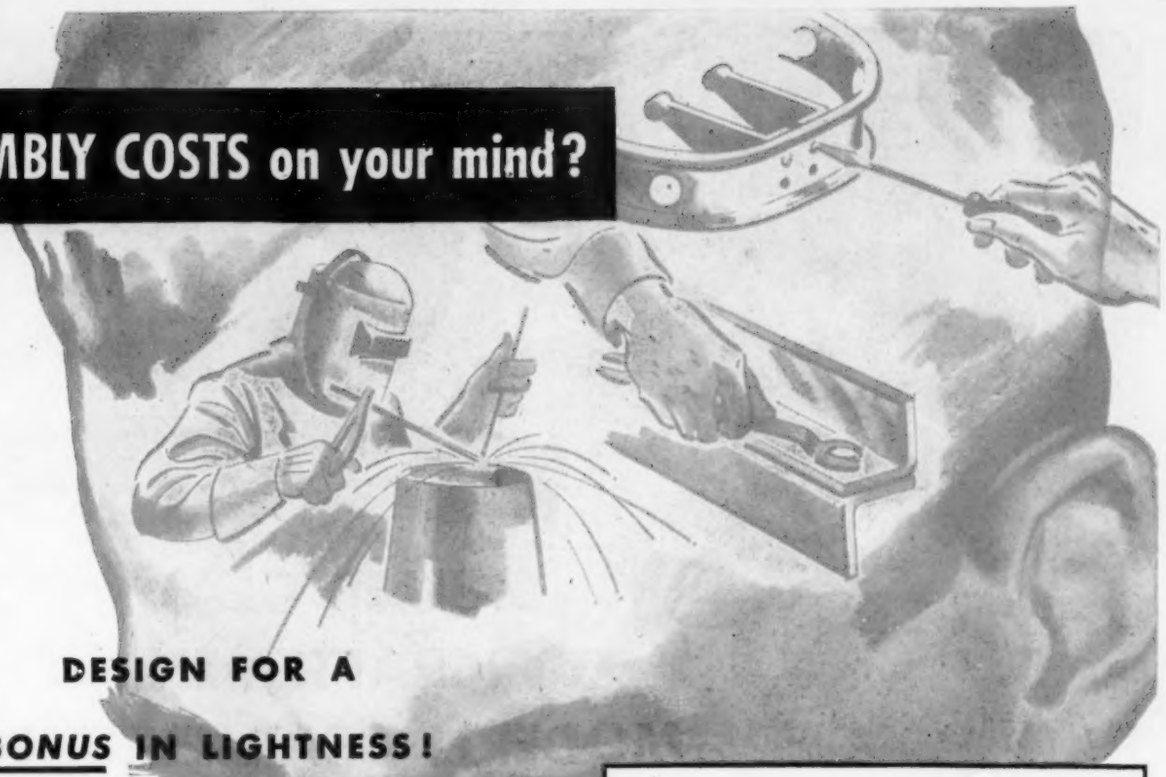
All controls being located at the operator's fingertips enables him to get maximum production in less time thus holding costs to a minimum.

If you have work calling for a radial drill put your next job on a Fosdick—for speed—accuracy—and low cost.

Full details of construction and operation in Fosdick Radial Drill Bulletin RA. *Write for yours today.*

THE *Fosdick* MACHINE TOOL COMPANY
CINCINNATI 23, OHIO

ASSEMBLY COSTS on your mind?



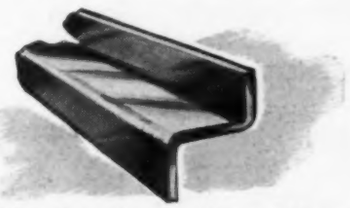
DESIGN FOR A *BONUS* IN LIGHTNESS!

Many American Magnesium products not only simplify assembly, but give *your* product a bonus in lightness besides! For American Magnesium is 35% lighter than aluminum, 75% lighter than steel!

You should know these semi-fabricated forms of American Magnesium, and the ease with which they can be applied to your design problems. And you should take full advantage of the 59 years of light-metal know-how of Aluminum Company of America, that stands ready to help.

At the right, are indicated the forms of American Magnesium that can simplify assembly problems in your plant. To answer the questions of their application, call your nearest Alcoa sales office, or write ALUMINUM COMPANY OF AMERICA, sales agent for American Magnesium products, 1709 Gulf Building, Pittsburgh 19, Pennsylvania.

ASSEMBLY OF stamped or cast parts may be simplified by an American Magnesium Permanent-Mold Casting. A single, high-speed cut brings it to desired finish and dimensions.



BUILDING UP of complex assemblies can be avoided with the use of American Magnesium Extrusions. Made to desired profiles. Die cost is low.

MAGNESIUM MAZLO Reg. U.S. Pat. Off. PRODUCTS

AMERICAN MAGNESIUM CORPORATION

DO YOU HAVE "DESIGNING WITH MAGNESIUM?"

This book belongs on the desk of every up-to-date designer. Full details of how to specify; choice of fabrication; physical, chemical, and thermal properties; shop practices; how to design. Sent free on request.

SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA

SKILLED GEAR CRAFTSMEN . . . MODERN GEAR CUTTING MACHINES . . .

. . . build quality and dependability into every ADAMS GEAR

the ADAMS line

- SPUR GEARS
- HELICAL GEARS
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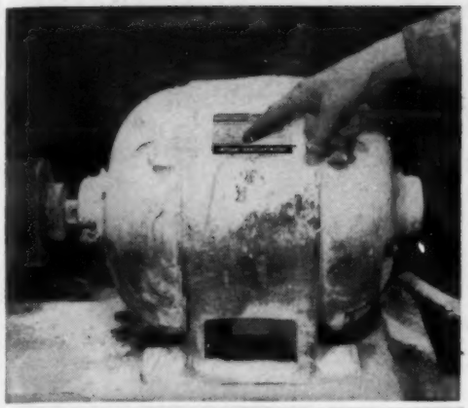
- SPROCKETS
- INTERNAL GEARS (Spur and Helical)
- RATCHETS
- SPLINED SHAFTS
- RACKS
- LEAD AND FEED SCREWS
- GROUND TOOTH GEARS (Spur and Helical)
- SHAVED TOOTH GEARS (Spur and Helical)
- GROUND THREAD WORMS

It takes experienced men and fine machines to make really good gears—Adams has both. In addition, Adams gears are quality controlled at every stage in their manufacture to assure exact conformance with your specifications. This extra care means better performance for your product. And in many cases, custom made gears, designed especially for the application, will cut assembly time and lower unit costs. Write for complete information today. THE ADAMS COMPANY, 1942 Bridge St., Dubuque, Iowa.

The ADAMS Company
Dubuque, Iowa, U. S. A.

GEARS

FINE GEARS MADE TO YOUR SPECIFICATIONS . . . ESTABLISHED 1883



Keeps Its Bearings in "Dust Bowl"

Ordinarily, we wouldn't recommend that you use an open motor on a job like this. This Tri-Clad motor drives a boiler-feed pump in the National Gypsum Company plant at Clarence Center, N. Y. The air surrounding the motor is constantly filled with gypsum dust which must be kept out of the bearings. And it *has* been kept out of the bearings of this Tri-Clad motor, thanks to its specially designed bearing housing and seals. We believe that the Tri-Clad motor you see here proves that even where dust, moisture, or some other hazard is extremely severe for open-motor applications, the extra protection afforded by Tri-Clad motor construction results in longer motor life and lower upkeep.

The toughest motor yet!

The Tri-Clad totally enclosed, fan-cooled motor is designed for use in adverse atmospheres — in iron dust, out of doors, in hazardous areas, and chemical atmospheres. It gives you these important construction features:

- **A cast-iron, double-wall frame which completely encloses and protects the windings and punchings.**
- **A nonshrinking compound around motor leads which protects motor interior from dust and moisture.**
- **A rotating labyrinth seal which further protects the motor interior from damage by foreign matter.**

TRI CLAD
REG. U.S. PAT. OFF.
MOTORS

ON 1,220,000 MOTORS

TRI CLAD

THE SYMBOL OF EXTRA PROTECTION

Announcement of the Tri-Clad motor, back in 1940, ushered in a new concept of general-purpose motor design. Substantially increased horsepower-per-frame-size was one feature. Smarter appearance was another. But what really sold more than a million Tri-Clad motors is the *extra protection* we built into them.

Today, with the "family" including dripproof motors, vertical motors, gear-motors, capacitor-motors, and totally enclosed motors, Tri-Clad motor is, more than ever, the motor that means basic protection, dependable performance, and minimum upkeep. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

EXTRA PROTECTION ... **AGAINST PHYSICAL DAMAGE!**

Rigid cast-iron frame and end shields protect vital parts from external abuse and prevent resonance. Because they're not at the mercy of a coat of paint, they strongly resist chemical attack and dampness. Cast iron also gives you tight, *metal-to-metal* fits between end shields and frame.

EXTRA PROTECTION ... **AGAINST ELECTRICAL BREAKDOWN**

Windings of Formex* wire together with improved insulating materials, reduce the chances of electrical failure. Heat is dissipated quickly — motor stays young for years and years.

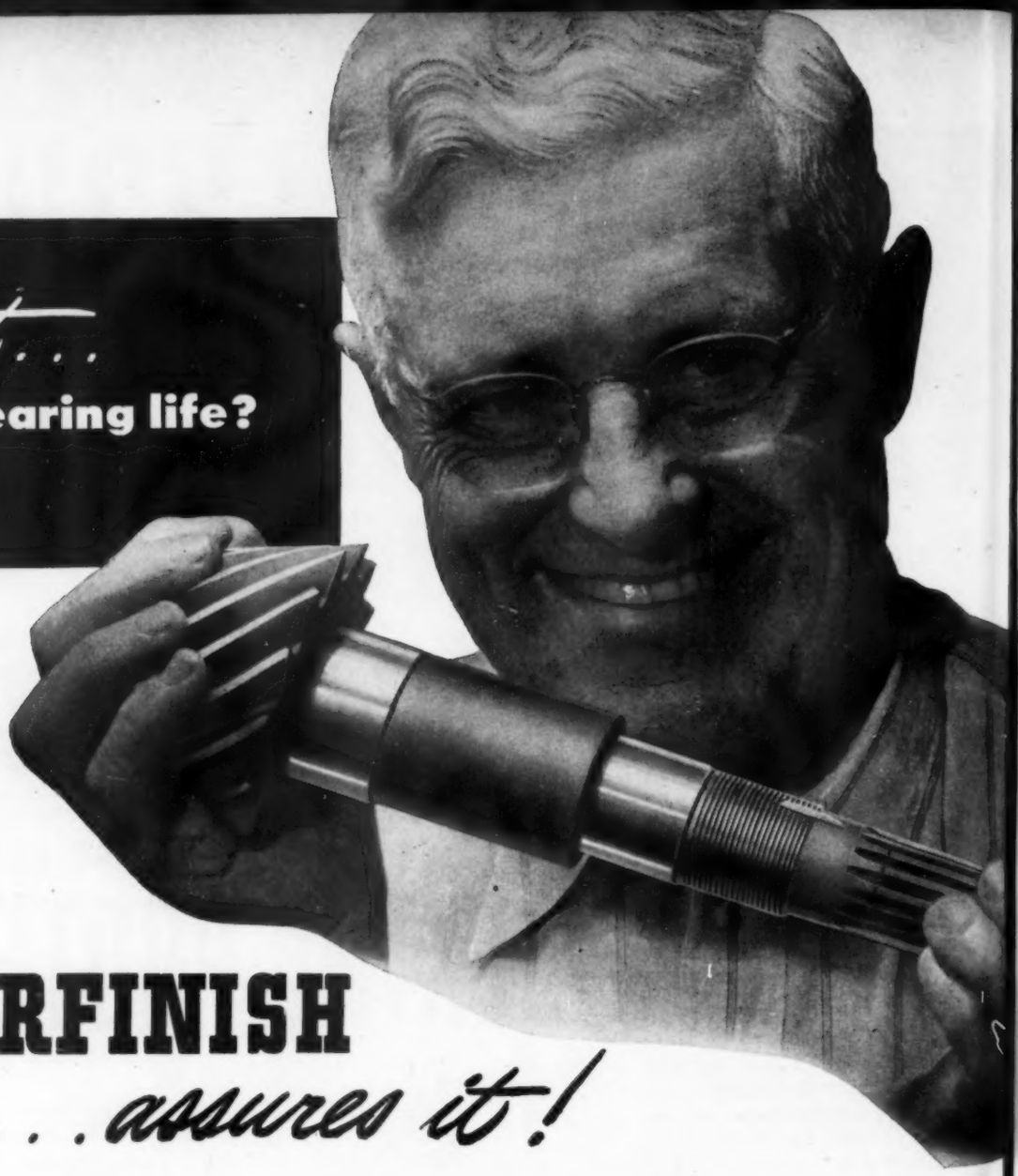
EXTRA PROTECTION ... **AGAINST OPERATING WEAR AND TEAR!**

Bearing design affords longer life, greater capacity, improved lubrication features. Bearing seals retain lubricant, keep out dirt. One-piece, cast-aluminum rotor is practically indestructible.

**Trade-mark reg. U. S. Pat. Off.*

GENERAL ELECTRIC

250—225C



want . . .
longer bearing life?

SUPERFINISH
. . . *assures it!*

● Yes, you can double—triple—quadruple—the life of bearings with simple, precautionary measures which take only a few minutes.

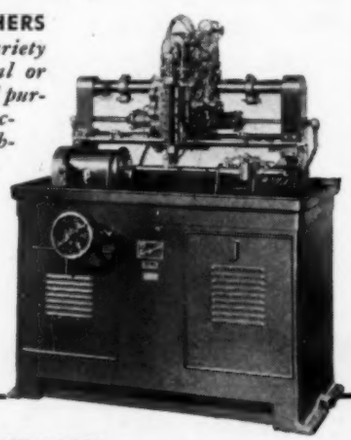
Examine a finely ground surface. No matter how smooth it may appear, it has defects in the form of grinder scratches, chatter and feed marks, and "smear metal" softened by the heat of grinding wheels. When these tiny metal ridges rub together, they rupture the protective oil film to cause scoring, excessive wear and increased clearances.

Superfinishing removes these defects—produces a bearing surface that is virtually frictionless. And its life is almost unlimited.

Superfinishing is a much quicker and more economical process than you may think. And it pays for itself many times over in better service and lower replacement cost.

Ask your nearest Gisholt Representative for the facts about Superfinishing.

GISHOLT SUPERFINISHERS *are available in a variety of types for cylindrical or flat surfaces; for general purpose or continuous production work; also as attachments for use on lathes. Write for literature.*



GISHOLT MACHINE COMPANY · *Madison 3, Wisconsin*

TURRET LATHES · AUTOMATIC LATHES · BALANCERS
SUPERFINISHERS SPECIAL MACHINES

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface finishing and balancing of round or partly round parts. Your problems are welcomed here.

Here's How You Can Cut Costs On those Small Wheel Jobs...

Specify "NORTON"

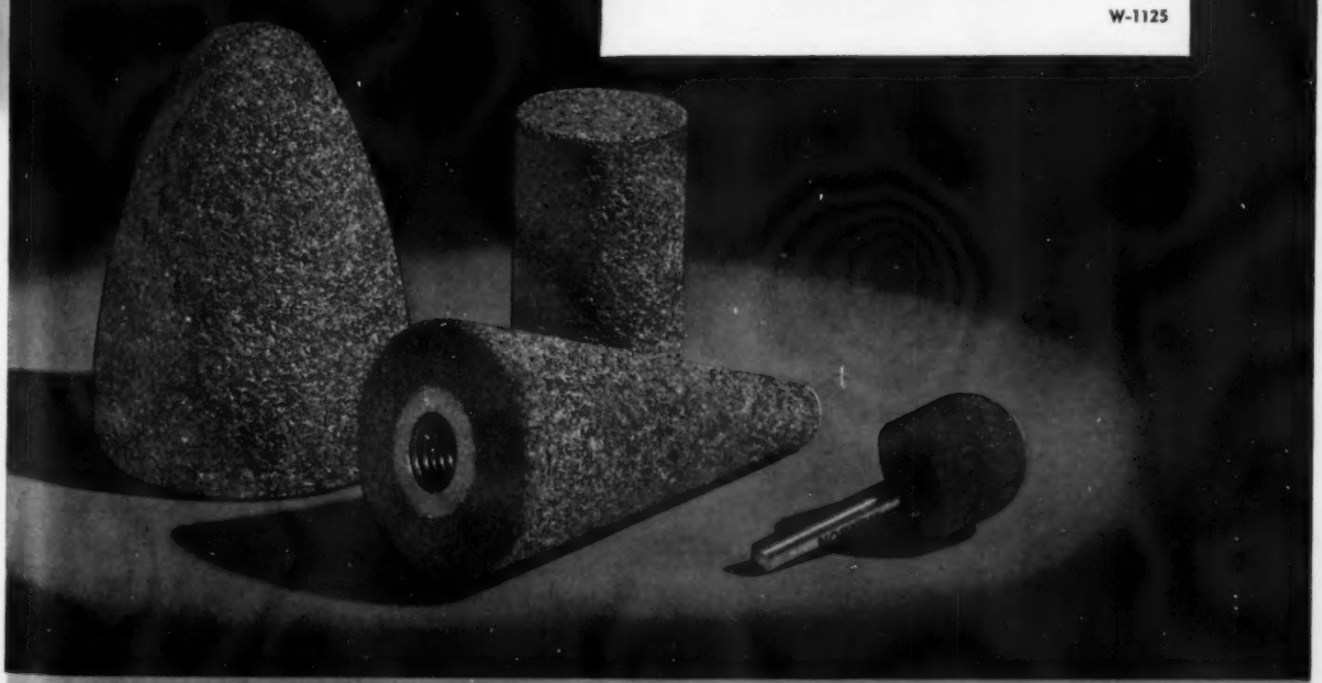
Small wheels are low cost items individually but collectively they can represent a tidy sum. Just a slight improvement in performance per wheel can add up to a real cost saving per month.

That's why in more and more plants they are specifying "Norton" for their small wheels as well a their large. They are finding that the same Norton savings which show up in the cost records for their large production grinders can be realized on their small grinders, too.

You'll find Norton wheels available in the most convenient sizes and shapes for all portable grinders, large or small—and, in the correct specifications for various types of metal. Most of them are in stock with your Norton distributor or at the nearest Norton warehouse.

NORTON COMPANY
WORCESTER 6, MASS.

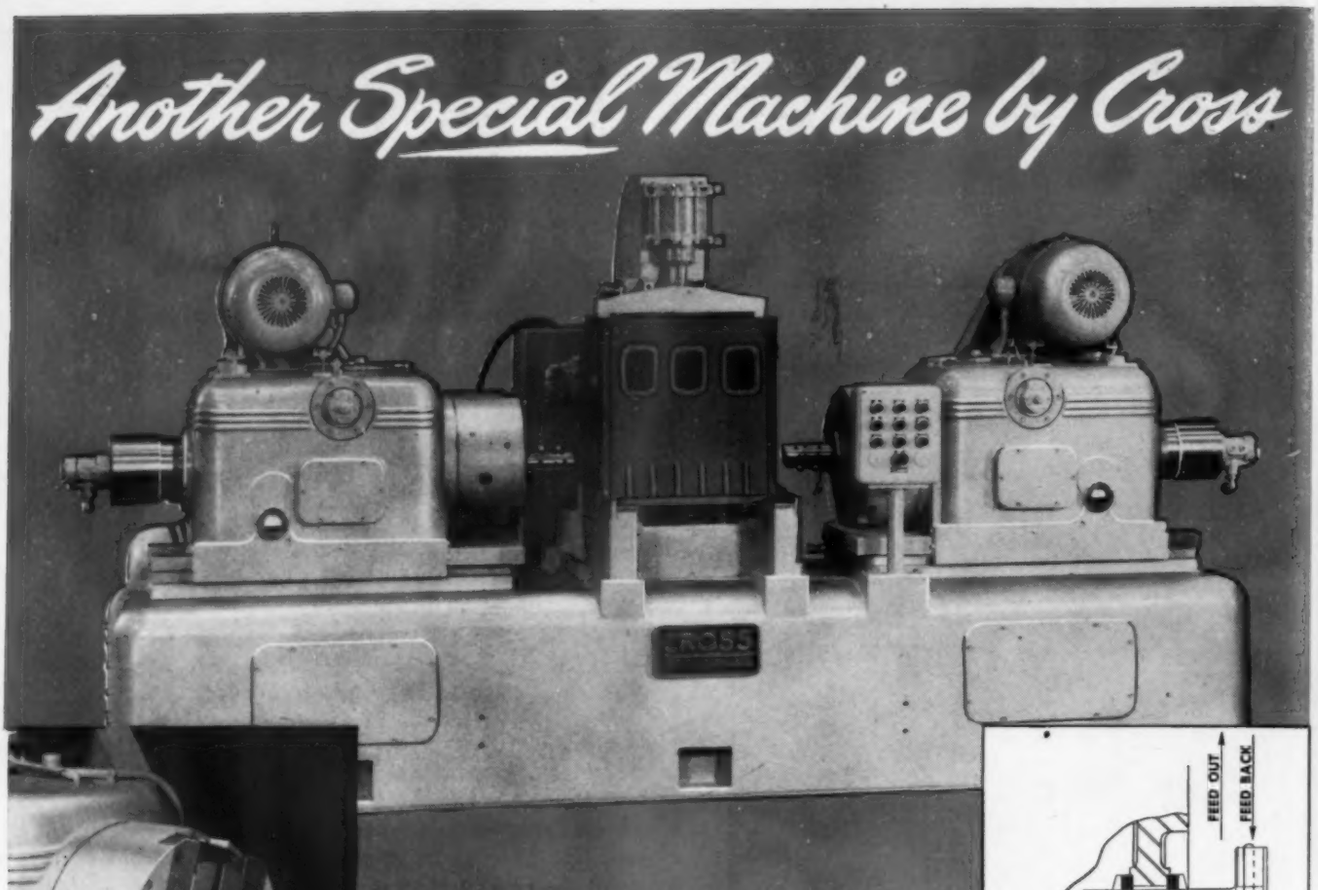
W-1125



NORTON ABRASIVES

T. M. REG. U. S. PAT. OFF.

Another Special Machine by Cross



New Method of Machining Thrust Faces

This new Cross machine offers distinct improvements over ordinary methods of straddle milling thrust bearing faces. ***With an unskilled operator,*** it machines with greater accuracy, a finer finish, and at lower cost. These advantages are made possible by the use of single point carbide tipped tools which can be reground many times (unlike milling cutters for this operation).

Since the heads are standard Cross units, they can be easily adapted for a variety of separate or simultaneous boring and facing operations.

PART: Diesel Engine Cylinder Block.

OPERATION: Straddle face the two end crankshaft bearings simultaneously with caps in place.

PRODUCTION: 41 parts net hourly.

FEATURES: The part is located, clamped and machined automatically—the operator simply presses the control buttons. The tools rapid advance into cutting position where, as they begin rotating, they are fed out .012″ per revolution for the roughing cut and returned .006″ per revolution for the finishing cut. The tools for both faces are mounted in one bar to assure parallelism.

All movements are interlocked for safety.

Investigate Cross Transfer-matics—the newest machine tool development for continuous automatic production.

THE CROSS COMPANY

Established 1898

©1947—THE CROSS COMPANY

SPECIAL MACHINE TOOLS

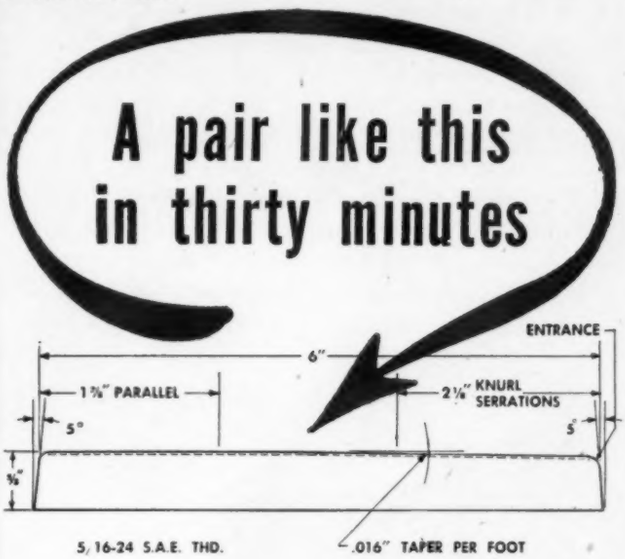
MILLING • DRILLING • TAPPING • BORING • TURNING • SHAPING • GRINDING • HONING

DETROIT 7, MICHIGAN

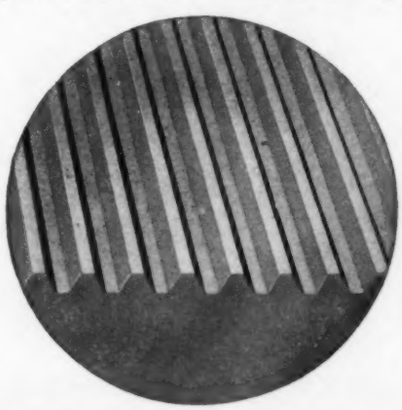
GRIND thread rolling dies?

... *the answer is* **YES!**

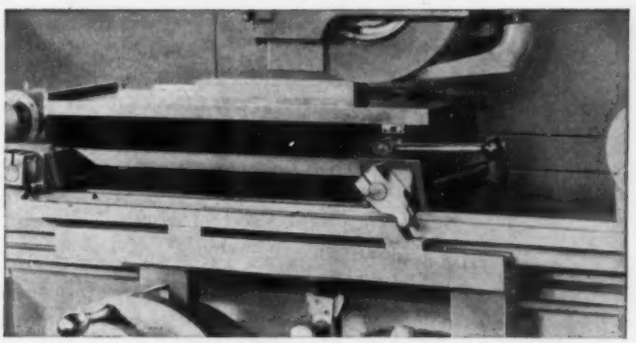
Now—through a new application of THOMPSON TRUFORMING—you can produce accurate duplicate roll thread dies and eliminate subsequent corrective operations formerly required. An example is the roll thread die shown here.



This is the Stationary Die (a perfect mate to the Moving Die not shown). Both were ground on a THOMPSON TRUFORM grinder from heat-treated alloy steel in less than thirty minutes. Note the radii, the precise taper and flat section. This is produced with a single cut—to full depth of thread form without resetting.



Enlarged tooth section shows form of threads and helix angle. By TRUFORMING dies are perfectly matched . . . there is no distortion.



Deformities are eliminated by TRUFORMING because work is finished right in hardened steel. Note the special forming fixture in the photograph, which makes possible completely automatic and highly accurate grinding of the longitudinal contour. These Thompson die grinding features are new with patents applied for.

Longer die life and greater die accuracy, plus ability to regrind dies without drawing, are three great advantages you get with this THOMPSON TRUFORMING application.

Write at once for complete details . . . Address Dept. **22.**

The Thompson Grinder Company • Springfield, O.

COPYRIGHT 1946, THE THOMPSON GRINDER CO., INC.

Quick-change Artist

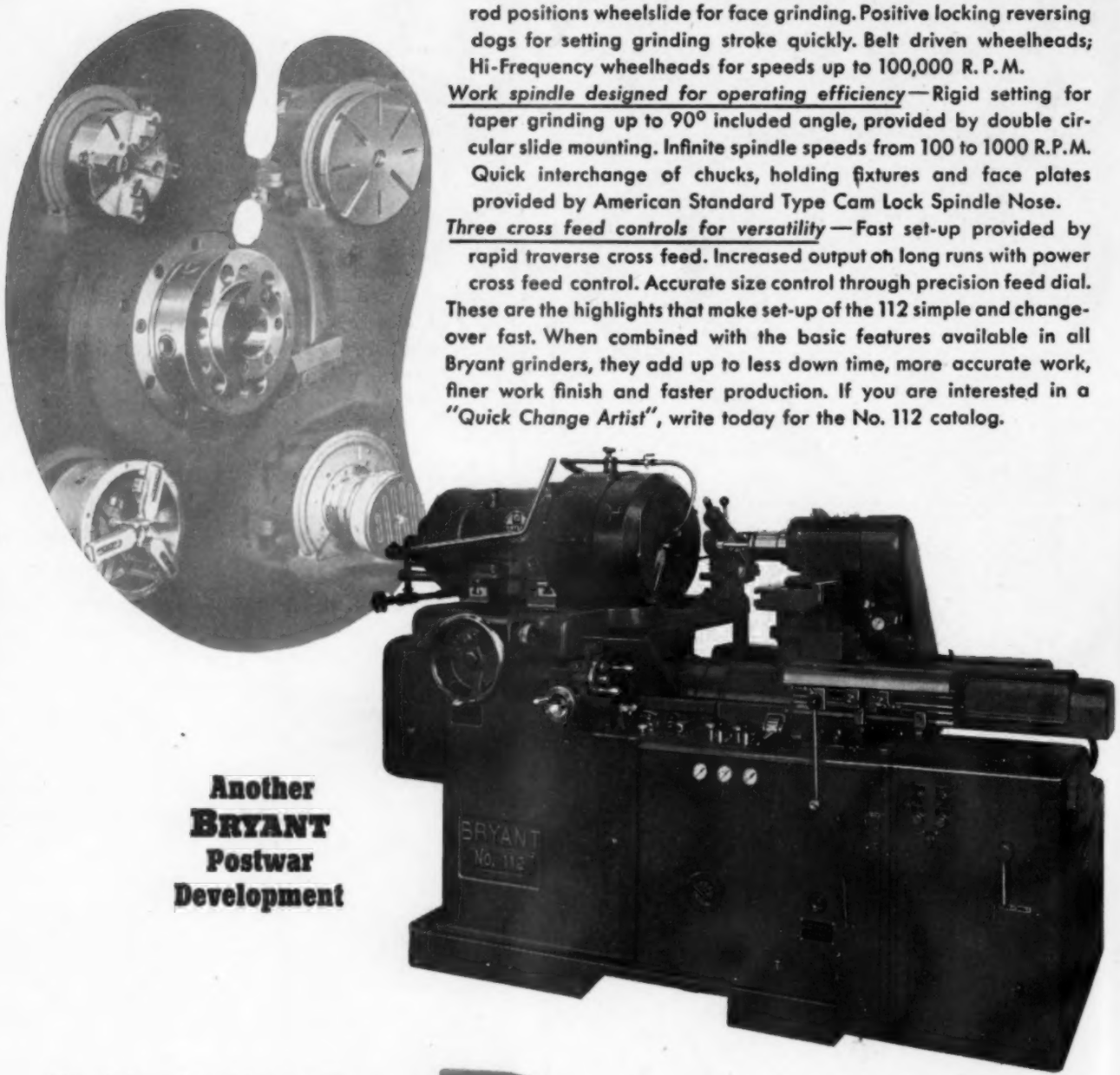
There are many design and construction features that make the Bryant No. 112 precision internal grinder a *"Quick Change Artist"*—make it easy to set up or change over to suit a wide range of jobs.

***Quickly adjusted cycle controls for wheelslide*—Selection of cycle phases either manually or automatically through main wheelslide control. Independent setting of wheelslide traverse for wheel dressing and grinding by two convenient hand throttles. Universal stop rod positions wheelslide for face grinding. Positive locking reversing dogs for setting grinding stroke quickly. Belt driven wheelheads; Hi-Frequency wheelheads for speeds up to 100,000 R. P. M.**

***Work spindle designed for operating efficiency*—Rigid setting for taper grinding up to 90° included angle, provided by double circular slide mounting. Infinite spindle speeds from 100 to 1000 R.P.M. Quick interchange of chucks, holding fixtures and face plates provided by American Standard Type Cam Lock Spindle Nose.**

***Three cross feed controls for versatility*—Fast set-up provided by rapid traverse cross feed. Increased output on long runs with power cross feed control. Accurate size control through precision feed dial.**

These are the highlights that make set-up of the 112 simple and change-over fast. When combined with the basic features available in all Bryant grinders, they add up to less down time, more accurate work, finer work finish and faster production. If you are interested in a *"Quick Change Artist"*, write today for the No. 112 catalog.



Another BRYANT Postwar Development

Send for the Man from

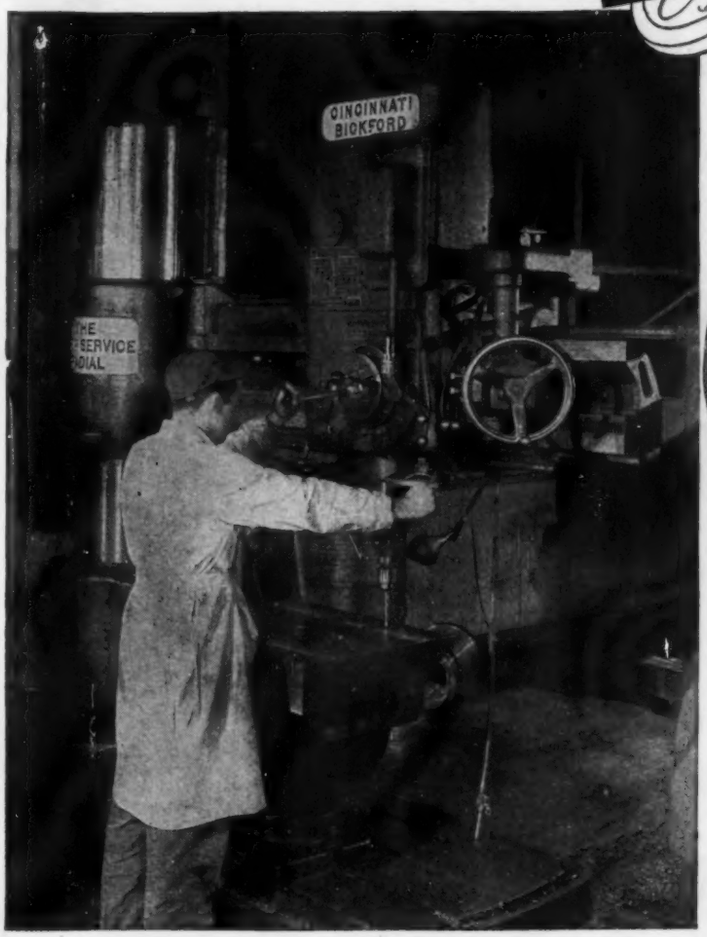
BRYANT CHUCKING GRINDER CO.

SPRINGFIELD, VERMONT, U. S. A.

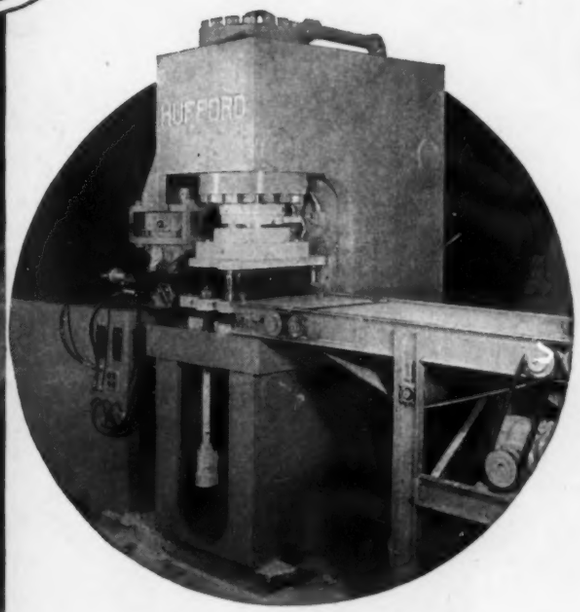
BRYANT

2 hours now

4 HOURS BEFORE . . .



Illustrations . . .
Courtesy Hufford Machine Works, Inc.



The 100-Ton Hufford Automatic Hydraulic Tile Press

Drilling, tapping and countersinking operations on a 100-ton press at the Hufford Machine Works, Inc., in one-half the time used before a Bickford Super Service Radial was on the job is a worthwhile saving.

We quote the Hufford Company:

"We needed a versatile drilling tool that would lend itself to a variety of operations. Our employees are enthusiastic over its ease of handling and performance—our management is pleased with its economy of operation, and its precision."

Remember Cincinnati Bickford Super Service Radials are profitable, versatile and dependable in your shop.

Write for Catalog R-24A

See our Condensed Catalog in Sweet's File.

MACHINE TOOL SHOW
DODGE PLANT
Chicago, Sept. 17-26
Booths 514 to 517

RADIAL AND UPRIGHT SUPER SERVICE DRILLING MACHINES

- *Equal Efficiency of Every Unit Makes the Balanced Machine*

THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio U·S·A·

DoALL'S OWN
Separate Machine Tool
SHOW

SEPTEMBER 15 TO 26

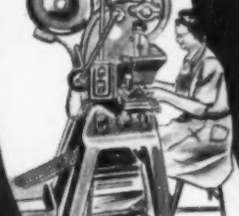
AT DES PLAINES, NEAR CHICAGO

free round-trip transportation from Chicago-Dodge Plant

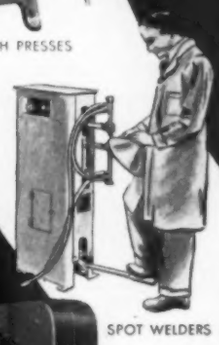
PRECISION SURFACE GRINDING

ELECTRONIC INSPECTION

FRICTION SAWING



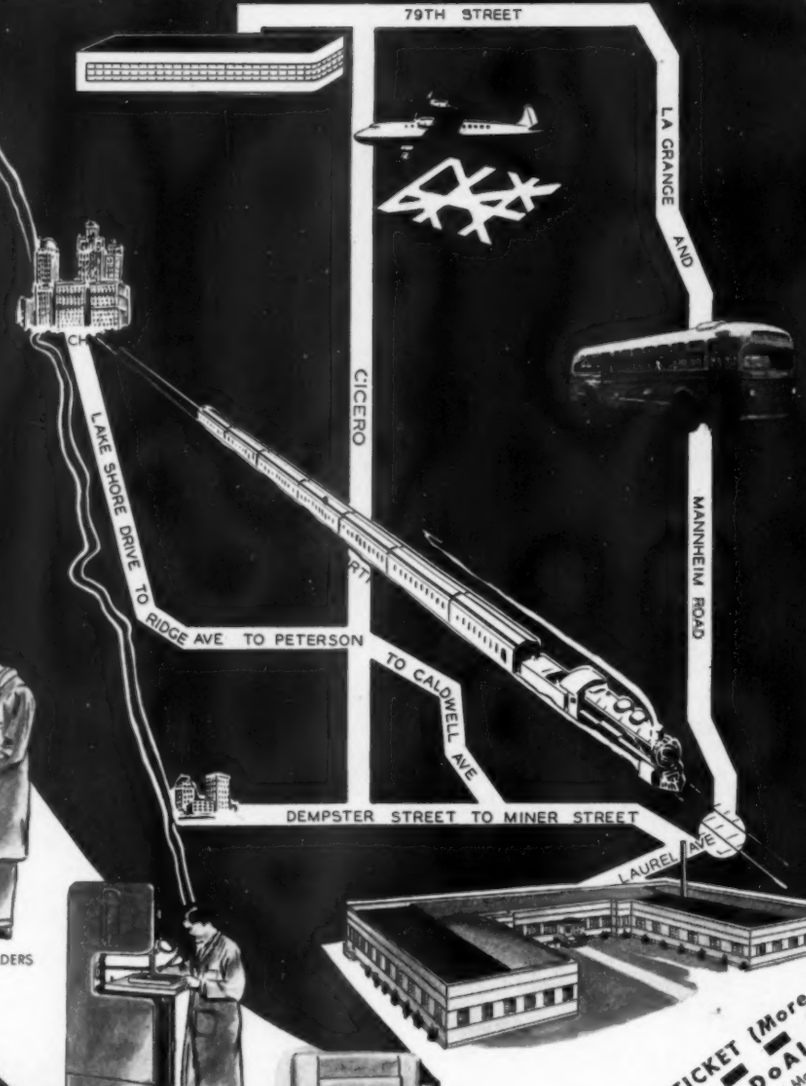
PUNCH PRESSES



SPOT WELDERS

CONTINUOUS BAND FILING

COMBINATION HEAT-TREATING UNIT



CARBIDE-TOOL GRINDING

NEW, L... BAND

HIGH-PRECISION LATHES

HERE'S YOUR TICKET *(More Available on Request)*
FREE ROUND TRIP TO DoALL CO., DES PLAINES,
Get bus schedules at DoALL booth 37 Machine Tool Show or booth 100 at International Amphitheater Show. Upon arrival at DoALL, Des Plaines, Ill., you will be reimbursed for bus or train fare from Chicago.

NAME_____ COMPANY_____

ADDRESS_____ CITY_____ STATE_____

American Machinist's Spot NEWS OF METALWORKING

International Association of Machinists, unlike CIO unions, will not boycott the new National Labor Relations Board. Instead it is advising its locals how to live with the Taft-Hartley law. It hopes to use the law to win separate bargaining rights for machinists who have been swallowed up in large CIO bargaining units.

Introduction of mass production in railroad car-building field may take its toll of parts makers. New Pullman standardized box car, for example, requires fewer purchased components. Pullman now is fabricating its own box car ends, roofs, uncoupling devices.

Boeing Aircraft's "GAPA" guided missile program has been transferred from Wendover, Utah, to Alamogordo, N. Mex. Boeing will be firing five to eight missiles a month. The rockets are designed to seek out and destroy enemy aircraft. It is the only AAF project of its type.

Yugoslavia is launching a Five-Year Plan which will need machine tools and other machinery. The plan specifies production by 1951 of 300 locomotives, 5500 goods wagons, 34,000 tons of agricultural machinery, 1500 tractors, 50,000 bicycles, 6000 lorries and 10,000 typewriters.

Quick replacement of hydraulic power units on machine tools is being provided for by several machine tool builders. One has a hydraulic power unit which can be wheeled up to a machine and connected to it in several minutes' time. Another has the unit mounted so that in two minutes it can be slipped out and replaced by a stand-by unit. A third has the unit outside the machine frame.

> **Not until the spring of 1948 will effect of Marshall Plan be felt by U. S. capital goods industries. It will take until March or April of next year to appraise European needs, formulate a White House program in terms of required goods and money and secure the necessary appropriations from Congress.**

Japanese metalworking equipment supposedly designated to be removed for reparations delivery has not yet been touched. Even 90 machine tool plants selected for reparations are still subject to change. Truth is amount of reparations to be exacted from Japan is being scaled down. At least two months more will go by before any machinery is delivered.

Effect of a handful of men on a billion-dollar industry: tripoli stone used in polishing many automotive parts is in short supply because a group of 15 miners struck recently. There is only one source of tripoli stone.

Radioactive isotopes are being used in making friction studies which may have important effects on design of bearings, pistons and other machine parts involving contact of moving surfaces. M.I.T. is studying details of what goes on in roller and friction bearings by incorporating radio-active metal on one element of the bearing. Transfer of metal from one element to other can be detected immediately by appearance of radioactivity on other element.

Special foundry courses will be started this fall at Cornell, Case, University of Cincinnati, M.I.T. and Wisconsin. Ten scholarships will be awarded in each of the five colleges by the Foundation which is backed by four foundry associations. Purpose is to attract promising young engineers to foundry industry.

Metalworking industry will squeak through next winter without curtailment of power services, barring bad breaks. Power companies will have slim generating reserves in a number of spots, probably as low as at any time during the war.

Walter Reuther's reelection as president of United Automobile Workers in November is foreshadowed by his victory in preventing amalgamation of the Farm Equipment Workers with his own union, as advocated by left-wing elements.

Turns little savings into big profits

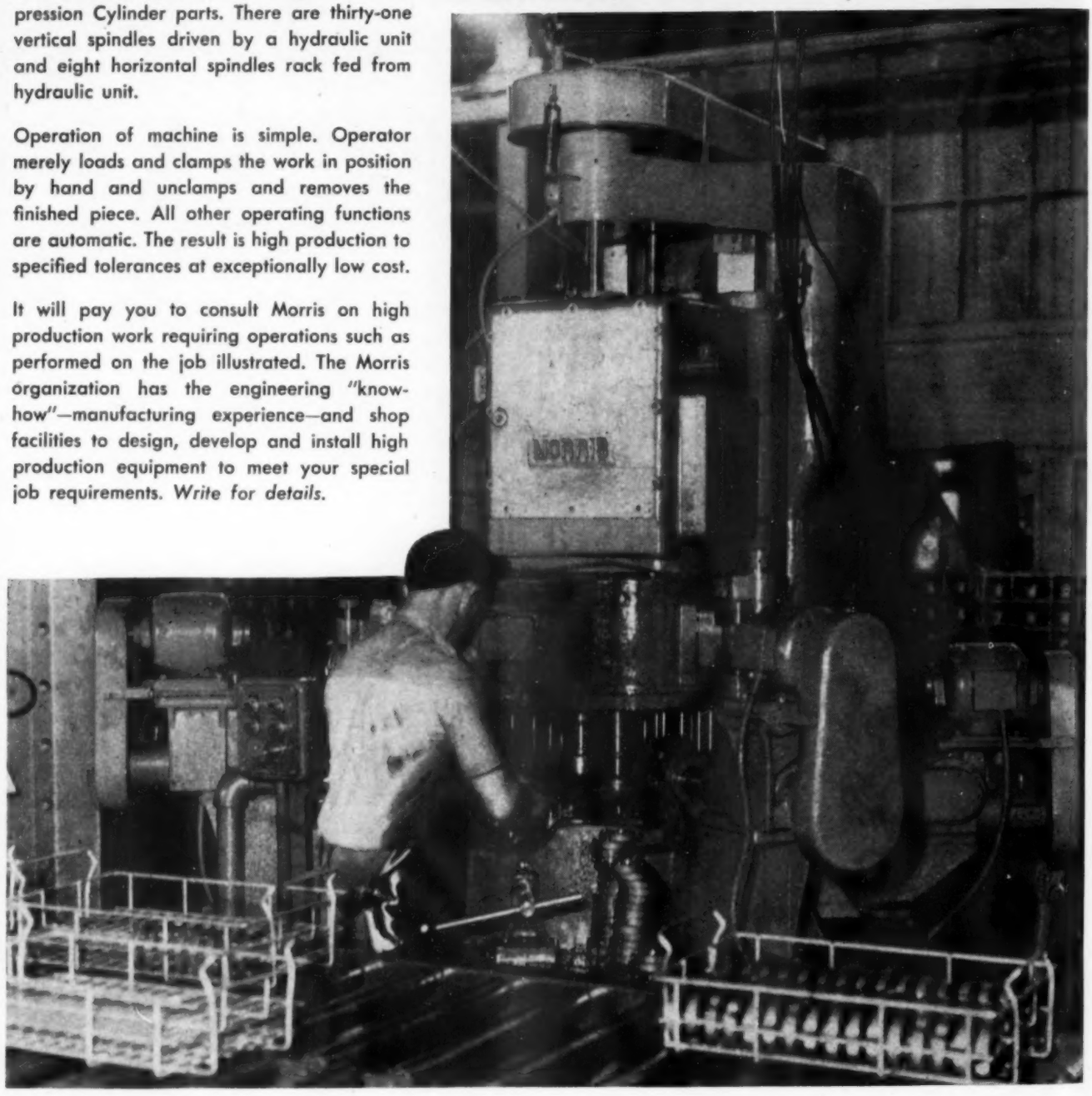
MORRIS
MOR-SPEED
VERTICAL HYDRAULIC MACHINE

• One of the advantages of this machine is that it is designed for the high production of a specific job and effects a saving on each piece. These savings soon mount into sizeable gains on big runs.

On the job shown the machine drills—reams—counterbores—countersinks and chamfers holes in various positions in refrigerator Compression Cylinder parts. There are thirty-one vertical spindles driven by a hydraulic unit and eight horizontal spindles rack fed from hydraulic unit.

Operation of machine is simple. Operator merely loads and clamps the work in position by hand and unclamps and removes the finished piece. All other operating functions are automatic. The result is high production to specified tolerances at exceptionally low cost.

It will pay you to consult Morris on high production work requiring operations such as performed on the job illustrated. The Morris organization has the engineering "know-how"—manufacturing experience—and shop facilities to design, develop and install high production equipment to meet your special job requirements. *Write for details.*



Builders of MOR-SPEED Radials

The MORRIS Machine Tool Co.

CINCINNATI 3, OHIO

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Everything To Gain

Our government asked for bids on an important construction job in a tropical region.

It was surprised when one contractor bid lower than anyone had anticipated.

This contractor got the job. But Washington wondered whether he could do the work for the amount specified and in the designated time.

Unlike the progress on other construction projects, not much seemed to be happening. Large gangs of men did not swarm over the place. The site appeared relatively deserted.

Shortly a limited number of specially-designed construction machines were delivered. They were put to work methodically, and still the site looked by previous standards as though the contractor was marking time.

To the amazement of government officials, the job was completed well ahead of time. And the refund to Washington of excess profits was eloquent testimony to the fact that the contractor had done well for himself despite the low bid.

The secret of the contractor's success was his willingness to part from tradition. He devised a new method of doing the job, using mechanical means to raise sharply the productivity per man.

His investment of tens of thousands of dollars in new machinery was made profitable by the resulting low labor cost. The machines were fully paid for during the life of the single contract.

The same opportunity which this contractor seized upon to his own advantage is open to thousands of manufacturers.

Go through almost any metalworking plant today and see for yourself what can be done. Few shops can be said to be "the last word."

The field for greater mechanization seems boundless. The chance to apply the new technologies appears inexhaustible.

Those who chose to use these technologies have everything to gain and nothing to lose.

They will get more productivity per man, hence can afford the highest wages. They will get prices within the range of the buyer's ability to pay, putting into practice the idea of more goods for more people at lower prices.

What is more, as the going may become rough, they will be awarded existing business when their competitors go orderless.

On a purely selfish basis, constant application of the latest ways and means of mechanizing metalworking pays rich dividends.

Burnham Finney

EDITOR

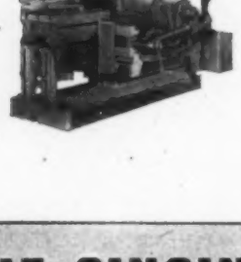
Shape - Form - Shear

...ON A "CINCINNATI"

Today Cincinnati Shapers are more efficient than ever before with heavier cutting capacities and speeds up to 200 strokes a minute on the 16"; and with a degree of ***accuracy*** that has never been excelled. Their power rapid traverse; multiple cam feeds; direct reading dials; and automatic oiling sell discriminating buyers. Coupled with these mechanical features are convenient controls; simplified adjustments; and means for quick and easy set-up, all of which please the operator.

Cincinnati Shapers are built in regular or universal type from 16" to 36". Ask for Cat. N-3.

See these machines under power at the Show



Cincinnati Press Brakes, the brakes of many uses, are today's machines for bending, forming, flanging, or multiple punching sheet metal. For easy fabrication, formed parts must fit; therefore ***accuracy*** is a fundamental advantage of these Brakes. Full-rated capacities; all-steel construction; built to withstand overload; deep bed and ram to avoid deflection are a few of the high points. These Brakes are built as accurately as a machine tool, and have unusual mechanical refinements.

Sizes to cover practically any requirement. Ask for Cat. B-2

See these machines under power at the Show

Cincinnati All-Steel Shears offer a new degree of ***accuracy*** in shearing sheet metal. They cut to tolerances that take a micrometer to measure; and shear with this ***accuracy*** at high speed. They shear a wide variety of material in both ferrous and non-ferrous metals. Hydraulic holddowns automatically clamp any gauge of metal with the same firm pressure; fine adjustments for the four-edge knives give more efficient use of the keen edge and longer life. Rapid, accurate gauging speeds up handling of the job.

Standard capacities of Shears range from 10 gauge to 1¼ inches. Ask for Cat. S-4.

See these machines under power at the Show

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

See these machines in action at the **Machine Tool Show** Chicago, Sept. 17-26. **Booth No. 417**

Show Preview . . . Act II

BY E. J. TANGERMAN
MANAGING EDITOR

Concluding the resumé of major developments in machining and machine tools scheduled at next month's Machine Tool Show

Milling Advances

SPEEDS, FEEDS, POWERS, RAISED As a result of extensive experiments, as well as practical experience, milling speeds for the carbides now range from 300 to 700 sfpm., with chip thickness not less than 0.010 in. for economy in power consumption and tool life. These heavier cuts, coupled with employment of a variety of radial and axial rake angles (many "negative" to give an obtuse cutting edge) have required machines with much more power. One line of knee-type machines, for example, includes 20-, 30-, and 50-hp. sizes, with 16 quick-change spindle speeds from 50 to 1250 rpm. and 32 quick-change feeds from 3⅛ to 90 ipm.

CONTOUR MILLING Contour-milling machines have been arranged for multiple spindles to produce several parts from a single master. Some have hydraulic control, so verticals can be used for die-sinking, horizontals for profiling 360° in a horizontal plane, the combination to handle irregular shapes in three dimensions. Quick-loading fixtures, many hydraulically or electrically operated, are extensively used to reduce loading and unloading time.

RIGIDITY STEPS UP SPEED To handle production runs with carbide, greater rigidity and power are built in, as well as flywheels to even out the rotating speed of the cutter spindle. On such machines, it is possible to production-mill steels heat-treated to 400 Brinell. On aluminum alloys, speeds of 20,000 fpm. and feeds of 240 ipm. have been used successfully. On such units, the major problem is chip disposal.

CLIMB MILLING ACCEPTED Climb milling, where cutter teeth rotate down onto the work instead of upward through it, has been found to increase cutter life. To use it successfully, backlash eliminators take out lost motion in the feed mechanism. One maker has adopted an overarm dampener, a compensator inside the overarm to reduce vibration.

MULTI-STATION MILLING Indicating the trend towards making machines independent of operators and reducing labor to a minimum is a machine which has six identical milling stations. Each station operates independently and all are mounted on a head rotating at an adjustable rate. The operator stands in one spot and unloads and loads parts at each station as they move past him.

PLANER TYPE PENDANT-OPERATED A planer-type miller with electronic drive has independent control of head and table speeds from a central pendant station. Speed-control dials and feed tachometers in the pendant enable the operator to change head or table feeds while cutting, or change spindle load automatically to suit surface variations.

AUTOMATIC CYCLING Automatic feed and rapid-traverse cycles, with rise-and-fall tables to clear the cutter on the return, can now be provided in almost any combination of interrupted cuts with uniform or variable speeds.

Grinding & Honing

GAGING BUILT IN Close tolerances and fine surface finishes are both achieved by grinding and honing or lapping. Cylindrical grinders are now equipped with automatic sizing, in one case with electrical gage heads which measure directly and stop the grinding cycle within tolerances of a tenth of a thousandth. A pneumatic gage is similarly used for

bore gaging and control. Other forms have been used for longitudinal control, in each case also providing a visual indication for the operator. An innovation is an automatic gage which sizes the ball groove of an inner bearing race, not to a predetermined diameter, but in relation to the mating groove in the outer race. This avoids the need for selective assembly. A tapered plug within three balls running in the outer race transmits a measurement to an electro-magnetic gage, as does a contact diamond riding in the raceway of the bearing being ground. When the readings are in proper relation, the grinding cycle is completed through spark-out.

MULTIPLE-WHEEL SETUPS Multiple-wheel setups are being developed to reduce number of operations. Several wheels may be mounted on a single spindle, or several wheelheads may each carry one or more wheels. In one case, four main bearings are ground at once in a machine with two twin-wheel slides. Wheels set at an angle in such machines frequently combine cylindrical and facing operations. Larger production grinders are being built also, both for dressing circular surfaces such as railroad axles, journals with wheels in place, and for surface grinding—handling an entire machine bed on the table and with wheels grinding all work surfaces simultaneously. A double-spindle flat surface grinder for parallel surfaces permits work to be passed in a constant stream between wheels.

HIGH-ACCURACY BORE GRINDING Recent developments in internal grinders permit such grinding to be done on the centerless principle and also have achieved accuracies and finishes once thought obtainable only by lapping or honing. This latter step has been achieved by redesign of machines for greater rigidity, preloading of bearings for wheel and work slides, as well as development of new bearing systems for hi-frequency electric or pneumatic wheelheads with speeds in excess of 100,000 rpm. and going higher. Temperature of coolant and lubricants is held constant and grinding rooms are air conditioned. A major reversal, however, is use of a relatively coarse, open-structure wheel.

AUTO CONTROL, LOADING, ADDED To speed production grinding, automatic control with rapid approach and withdrawal have been developed, and automatic loading is also used, including hopper feeds on centerless units.

CONTOURING ADVANCES Contour grinding, on which the wheel periphery is dressed to the inverted shape of the workpiece, has offered many economies. For simple shapes, dressing is done with a diamond; for more complex ones, a hardened steel roller having the same peripheral contour is forced into the wheel to break down the bond, thus reproducing its own shape in the wheel periphery. Wheels so shaped can be used either for cylindrical or surface grinding, with either plunge or traversing cuts.

CRUSH VS. DIAMOND DRESSING Recent reports indicate that the crush-dressed wheel removes stock faster and generates less heat than diamond-dressed ones, but parts are less accurate and exact in contour. Diamond-dressed wheels produce a better finish but require longer for dressing. Some combinations of abrasive and bond cannot be crush-dressed well. Resinoid-bonded wheels are too resilient to crush, and some hard vitrified wheels are so brittle they crumble and shatter during crush-dressing.

In general, crush-dressing is considered preferable for small, thin pieces easily distorted by grinding heat and for complex shapes, as well as for rough-grinding contoured pieces, the diamond being used in the latter case for dressing the finish-grinding wheel and for forming the wheel to grind the crushing roll.

MULTI-SPINDLE HONING Improvements in grinding techniques have somewhat reduced the need for lapping, but multiple-spindle hydraulic honing machines still finish cylinder bores. Further, tests indicate service superiority of fine-finish bearing surfaces.

AUTO-CYCLE HONING Automatic electronic control of operations after the bore is honed to size will be provided in one new honing machine, including runout, tool collapse and withdrawal. Elimination of moving parts makes control simpler, and operation is faster and more uniform than with conventional switches. Control is through a Norbide insert in the gaging ring, contacted at each pass by plastic tabs on the ends of the stoneholders. These wear at the same rate as the stones, thus compensate for this variable. When the bore is to size, outside diameter of the tabs is great enough to grip and rotate the Norbide ring, thus actuating the electronic unit. The operator need only load and unload the fixture.

SURFACE-GRINDING BROADENED Improved wheels, careful machine adjustment and proper operator training now make it possible to surface-grind to limits of 0.0003 in. and a finish of one or two microinches. One new surface grinder, for example, has electronic control for wheel speed and table feed, hardened ways and screws, another has both horizontal and vertical shafts with multiple wheels, still another provides hydraulics as a "lift" to hand operation of the table in the range of 5 to 50 fpm. Diamond wheels of new types can grind optical-glass prisms, ceramics, quartz and sapphire. Such materials have also required development of special fixtures, even special forms of magnetic chucks with magnetic hold-downs for non-magnetic materials. Finishing can be done to high accuracies.

CLOSER TOLERANCES Automatic-rotating fixtures, indexed under several spindles progressively, hold bore tolerances to 0.0003 in. or less in production and remove as much as 0.012 in. of stock per minute from hard steel parts.

AUTO UNLOADING The trend is definitely to automatic unloading as far as possible, by air jets, etc., on some machines, by through feed on centerless machines, by chutes or conveyors to hoppers, and similar arrangements.

Toolroom-cutter grinders are now able to grind contours, providing correct clearance or backoff across the entire face of a milling cutter, follow a helix angle, and apply effective rake angles.

CLOSER, FINER Surface grinding is leading to closer tolerances, finer surface finishes. Sturdy machine construction and tricky fixturizing enable use of face-traversing machines for a wide variety of critical operations. To gain rigidity, one company, for example, buys motor stators and rotors, builds its own housings and inserts its own shafts, considerably larger than the usual motor shaft.

Threading

ROLLING DEVELOPED A recent modification in thread rolling is a machine which first forms a point chamfer. Another is a machine with circular dies. It may be horizontal or vertical and have two or three rolls. Hydraulic roll feed is considered smoother and easier to control. Thread-rolling machines are now, incidentally, being applied to many other jobs, such as knurling, chamfering, flanging, serrating, threading small worms, even equipped with longitudinal feed so long bars can be threaded.

LEADSCREWS ADDED Military insistence on Class 3 and 4 fits forced a shift to ground taps and dies, in machines which were not only smooth running but also guided the tool. In many cases, positive feed through a leadscrew proved advisable. One such machine combines a hob as an extension of the precision-ground leadscrew. This hob is used to cut internal threads in two solenoid-actuated brass fingers which thereafter serve as a leadscrew nut. Whenever backlash appears, the fingers can be rethreaded. This machine also incorporates depth control to a tenth of a revolution in tapping to a shoulder or into a blind hole.

FINE THREADS GROUND Many threads are now ground, fine-pitch ones from the solid. This is particularly helpful on heat-treated parts which may have been distorted slightly. Both internal and external threads can be ground, providing diameters are large enough in the former case to permit use of an abrasive wheel. A recent innovation is centerless thread grinding with a crush-dressed wheel first trued and chamfered with a built-in diamond. Thread ridges are annular, through-feed of the workpiece being obtained by feeding it at the thread helix angle in relation to the grinding wheel. Work is supported by a narrow guide and a plastic backing wheel soft enough not to mar it. The plastic wheel eventually becomes ridged, which aids in feeding.

Sawing

FRICTION BANDSAWING Friction circular sawing has long been familiar as a method of cutting rails and heavy bar to length. The same principle has now been adapted to bandsawing, particularly the harder, tougher steel alloys. A dull blade, run at about ten times normal surface speed, literally burns its way through the metal to be cut, but neither the blade nor adjacent surfaces are burned in the process. One new high-speed machine has a dual speed range, 100-300 and 1700-5100 fpm., to handle both conventional and friction sawing. A special transmission and variable-speed drive does it.

CONTOUR SAWS VERSATILE Contour band sawing has been widely applied in die and tool making to produce both male and female members in a single cut. Special bands of file sections and sanding bands also increase the versatility of these machines.

TRICKY FIXTURIZING These grinders for a long time have been known to cut time on so-called "Blanchard" jobs—flat surface machining where they can out-perform millers and planers. But by clever fixturizing, non-magnetic items, such as range-finder prisms, jewels, etc., can be finished economically. On some fixtures, non-magnetic parts are held by steel blocking, whereas others make use of an adhesive that cements the part to a steel fixture which may have several surfaces to bring the part into various grinding positions.

Gear Cutting

CLOSE SHAVING EVOLVED War requirements for "zero backlash" fine gears on a production basis resulted in development of a gear shaver capable of removing 0.0002 in. from tooth thickness with a rotary tool. Rack cutters are also used, and the process has replaced "green" grinding on such parts as automotive ring gears. In the latter case, a 15⅜-in. dia. gear is completed in 20 sec.

PRODUCTION GEAR CUTTING For mass production of spur or helical gears, a novel machine will cut all teeth at once. The blank is chucked on a horizontal table, while the vertically reciprocating circular cutting head has one tool per tooth. After each stroke, tools are fed in by a cone within the head. Cutter heads are special for each pitch and diameter of gear. A newly designed

machine applies the planetary principle to gear shaping, blanks being mounted on work spindles groups around a central planetary cutter. Machines with four and six spindles are already in test use.

BEVEL-GEAR CUTTER Another new machine, for cutting bevel gears, has a cutter like a circular saw, except that each tooth cuts successively deeper so one tooth is generated per cutter revolution. The cutter revolves continuously on a vertical axis; work is indexed at a gap of several teeth in the cutter. Cutter axis "floats" forward and then back to form.

GRIND SPIRAL-BEVEL TEETH Machines for spiral-bevel gears now cut various kinds of toothed couplings and clutches, working opposite sides of two teeth at a time. Among gear grinders is one which will finish spiral-bevel teeth with a cup wheel, another which will handle spur and helical gears up to 30 in. dia. and 2 D.P. The latter uses a V-form grinding wheel reciprocating vertically and trued by three diamonds either to true involute or relieved-tip form. Internal-gear shavers and lappers have also been developed.

AUTO-CYCLE CLIMB HOBBING A recent gear hobber is designed for climb cutting, and works on an automatic cycle with rapid approach and withdrawal. Setup changes are simplified by using one change gear with the same number of teeth as the piece to be cut, another with a number of teeth equal to thousandths of an inch feed per revolution.

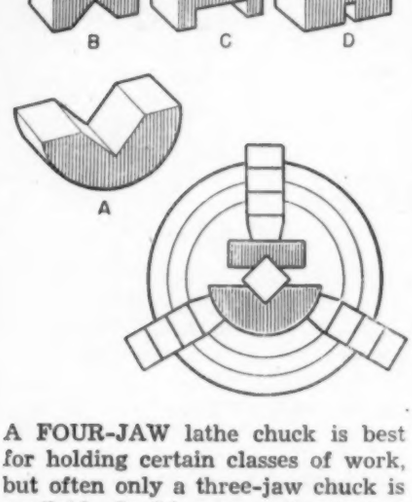
CARBIDE TOOLS APPLIED Carbide-tipped hobs and gear-shaper cutters, while costly, have both proved successful. Hobbing machines for carbides have twin worms and wheels driving the table, one handling roughing while the other handles only light finishing to minimize wear.

Other

BRAKE AND DIE CUSHION A new press brake incorporates combination manual and electronic control, a tonnage indicator, and wide-angle ram extenders, thus in effect being converted to a mechanical press. A special die cushion for inclinable presses avoids the need to dig a pit for a cushion for maximum capacity.

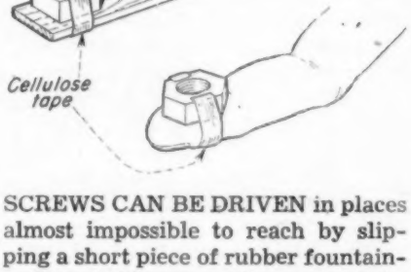
Short Cuts FOR THE SMALL SHOP

A. H. WAYCHOFF

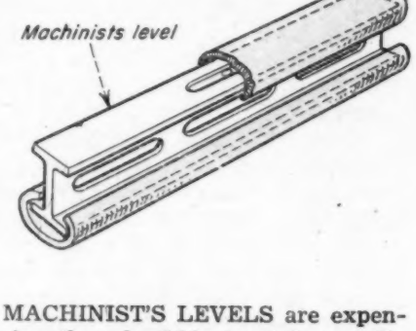


A FOUR-JAW lathe chuck is best for holding certain classes of work, but often only a three-jaw chuck is available. In this case, make a set of blocks like *A, B, C* and *D*. Block *A* is a half-round with a V-notch in the center, and this block is used at all times as the supporting member. Rectangular block *B* also has a V-notch, and is used in conjunction with *A* to center square or rectangular stock as shown. Special shapes can be held with blocks like *C* and *D*.

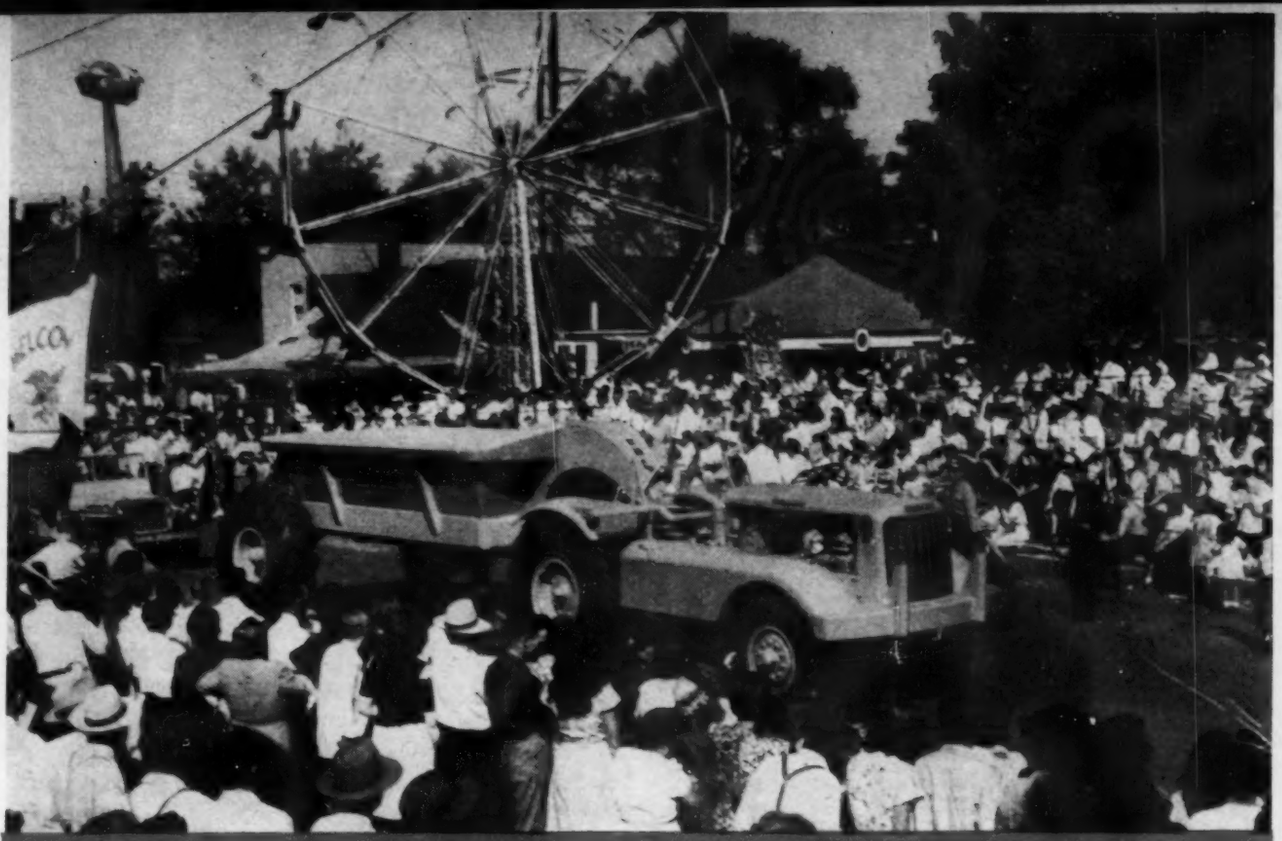
CELLULOSE, or "Scotch", tape has a multitude of uses, but here is another one: Did you ever try to turn a nut onto a screw, when the end of the latter was all but impossible to reach? In such cases, fasten the nut to the finger or a stick with the tape, position the nut over the screw end, and turn the screw head with the other hand.



SCREWS CAN BE DRIVEN in places almost impossible to reach by slipping a short piece of rubber fountain-syringe tubing over the end of the screwdriver blade. Push the head of the screw through the tubing until the slot is engaged with the blade, then push the assembly into the hole and drive the screw. This stunt is especially good for short screws.



MACHINIST'S LEVELS are expensive; they should be treated carefully when not in use. To protect the finely finished faces from nicking or bruising, split two pieces of garden hose lengthwise and slip over the edges of the level as shown.



Community Relations Are Important

Caterpillar employs 25% of the workers within 30 mi. of Peoria, so has a special division to develop and hold local confidence

BY L. J. FLETCHER

DIRECTOR OF TRAINING & COMMUNITY RELATIONS
CATERPILLAR TRACTOR CO.

IT IS HIGHLY IMPORTANT to any plant to have its fellow townsmen and the people in neighboring communities feel friendly toward it. The advantages of getting along well with the neighbors are as obvious as the disadvantages of squabbling.

Our goal always has been to develop the feeling in the community that "Caterpillar" is an asset here; is human rather than a pile of bricks and steel, and generally a desirable neighbor. It has thus far been and will continue to be our job to provide the human point of contact for our company where civic groups or organizations want help. This means corporate help of any kind, whether it be a contribution in cash, aid in providing a program, a chance to meet some particular person in the company, an opportunity to visit the plant, digging a church basement, or a score of other things.

The basic problem is similar for every manufacturer, even though the prominence with which it stands out among his other problems depends upon size of community, size of company, and various other conditions. It is probable that community relations came to our attention a little more emphatically than to most companies because our company became by far the largest employer in a city of something over 100,000 people.

The relatively rapid growth of the business and its employment of a steadily increasing proportion of the employable people in the community created a situation which focussed the attention of Caterpillar management upon the need for doing a local public relations job. As Caterpillar grew, it drew to its payroll about one-fourth of all people gainfully employed within a 30-mile radius. By our very size we sprouted a need for tending our community relations. It became apparent that this program must concentrate upon developing and retaining respect for and confidence in the company and its people. We felt the need to have our neighbors understand the company's aspirations and achievements, its programs and problems. This need never has decreased, even though much progress has been made in eliminating misunderstanding.

Special Division Set Up

Responsibility for this work was placed three years ago in a Community Relations Division, closely associated with our Training Divison. Problems of these two divisions are not dissimilar.

Three objectives were set up when the Community Relations Division took over the task, and these remain unchanged: (1) To keep the community correctly informed about the company, (2) To work with the community's people in civic affairs, (3)

To foster a friendly, sympathetic relationship between community and company.

The division uses five specific approaches to its objectives:

(1) Contact with local newspapers and radio stations, including news releases, has until recently been maintained by and through the division. This contact is now handled by the company's News Service, which takes care of all news whether local or national. Community Relations continue to originate story material of importance in furthering its program, and gives guidance where desirable for local news handling.

(2) Participation of company personnel in civic organizations is encouraged, and selected company publications are sent to community leaders to keep them abreast of our problems and progress.

(3) Groups from the community are invited to make factory visits. They are guided through the plant by competent members of the Community Relations staff, and they stay with us for dinner and talks by company executives.

(4) Requests for donations are handled in the division.

(5) A list of company people competent and willing to talk before community groups is kept on hand, and help is provided to any of these folks who may wish aid in preparing.

At the root of our community relations policy is the deep-seated belief that friends are made—or lost—one at a time. We have sidestepped every temptation to try making friends on a wholesale scale. Not that we would not rejoice to bring to the entire local population a friendly understanding of our company at a single stroke of advertising, or by a single paid campaign. But we simply do not believe that it can be done that way, or that fast. The American public is too discriminating to let anyone—least of all, a corporation—buy goodwill by writing a check.

To meet emergency situations, such as the need to present the company's side of a labor dispute, we have on occasion bought radio time and newspaper advertising space. But, for the more difficult, broad-scale, long-term task of building ourselves into acceptance by the community as one of its integral parts, we have never found any such method sound.

We consider the local newspapers and radio stations important media for disseminating news of what goes on in our business and among our employees. But we definitely do not view these as arms of our own business for putting out to the community what we want to get published.

Rather, these are primarily public servants upon whom rests the obligation to bring to their readers and listeners whatever news of us they consider worth printing or putting on the air. This duty they discharge conscientiously.

To them we therefore owe full cooperation in obtaining this news—even when, as happens occasionally, it is something that we would just as soon not brag about. Dealing thus frankly with the papers and radio is not only a duty; even more, it is a commonsense method of convincing them (and through them the community) we have nothing to hide.

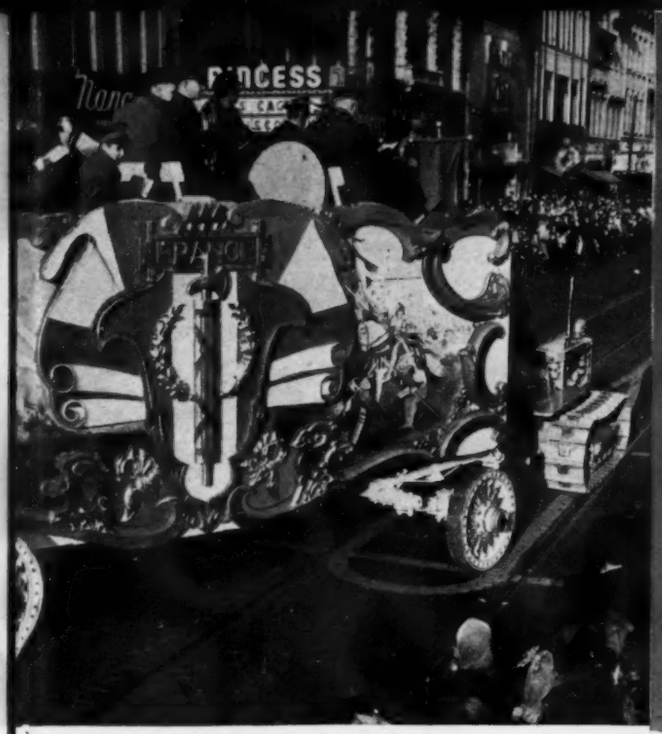
It is really as part of our community relations program that our News Service maintains contact with local radio-station managers and news broadcasters, with newspaper editors and reporters. It handles their inquiries and requests for information. When news develops about the company or about company personnel, the News Service supplies news releases.

Highly Satisfactory

This method has proved highly satisfactory in terms of the company's interests. The radio and newspaper men say it is equally satisfactory to them, and the results seem to bear them out. Last year the newspapers of the area used 945 stories about us and our personnel, for a total of 5,947 column inches. Practically all of this was characterized by a friendly, understanding attitude. We attempted no statistics on radio coverage, but feel that generally we were covered proportionately about as thoroughly and sympathetically on the air as in print.

Our belief that making friends is a one-at-a-time job means that we think it has to be done man to man, around the table, or across the back fence, swapping ideas with people in

This "Visitor's Guide" was prepared for taxi drivers and hotels in town—so they could properly direct visitors to the right one of six reception rooms at the plant—some as far as 1/2 mile apart and a source of possible irritation to misdirected visitors



Even Christmas parades can make use of tractors loaned for the occasion

All kinds of groups are taken through the plant by trained guides

other walks of life. Only thus can we hope to become known in the aggregate as the individual men and women who actually are Caterpillar Tractor Co.

Our policy has been stated also in terms of the responsibility that rests upon the men of management. We hold that such a man must assume his share of the job of getting acquainted with folks in other groups in our community. He must be eager to answer the questions which come from fellow citizens who are interested—or merely inquisitive—about "Caterpillar" and what makes it tick.

Aid on Civic Jobs

We are careful never to put pressure on our people to assume civic jobs, but we make it just as easy as we can for them to participate. The division even keeps a comprehensive file of such organizations and their officers, complete with addresses and telephone numbers, so any Caterpillar man or woman can get in touch with civic activity at will. Also, it is known throughout the organization that we are happy to have them carry their fair share of the load in local organizations devoted to civic and welfare objectives—or even a little more than their fair share. If a man takes on a big load in such an activity as Red Cross or Community Fund drives, the company willingly eases up for a few weeks on the pressure of his bread-and-butter job. This knowledge has permeated not only our organization but also much of the community, and undoubtedly has helped to earn for Caterpillar a standing as a good, public-spirited citizen.

Almost as importantly, the division is eager to receive suggestions from our people about ways in which the company can aid organizations of civic type in which members of our own force are interested. In consequence of such suggestions, Caterpillar trucks and construction equipment manned by our employees are occasionally to be seen at work in Peoria and vicinity on assorted chores for the Boy Scouts, for clean-up drives, for the U. S. Post Office's Christmas peak, or for anything of this general sort. The equipment and personnel are, of course, supplied at company expense. Actually these jobs come at reasonably long intervals, involve relatively little cost, and make for us a disproportionately large number of warm friends. Moreover, our personnel and our company as residents of the region get the benefit of any improvements that are thus brought about in the community.

This kind of activity has particular significance because it registers us as good citizens in the consciousness of the leaders of community work and thought. Another way in which we strive to win their understanding and goodwill is through a mailing list. About 8,000 people who are outstanding in the community's churches, schools, businesses, professions, and government units receive from time to time our house organ, our annual report, and publications that we issue on occasion to inform our employees about company programs and progress. (We placed barber shops and beauty parlors on this list last year, and find that customers awaiting their turns are eager readers of these pieces.)

When one of the local leaders accomplishes something about which we hear that is especially worthwhile, a letter of congratulation goes to him from a company officer.

Conference Groups

For ten years Peoria has carried on a program of monthly conference groups meetings comprising farmers and business men, aimed to achieve mutual understanding. This has grown to include leaders in labor, church, and schools, but the total number of people in the group is held to a maximum of 60 to avoid unwieldiness. There is also a monthly dinner conference of labor leaders, business men, and clergymen; and, a third group set up in the same general way that brings together labor leaders, business men, and educators. The original group was organized by us, and the other two groups had a good share of Caterpillar leadership in their founding. Our company's continuing participation in all of these conference groups is an important part of this division's work. Incidentally, the agriculture-industry plan has spread throughout Illinois and shows signs of becoming nationwide.

Our factory-visit program was interrupted during the war for security reasons, but has now been solidly reestablished. It is first cousin to these other plans. It achieves for the visitor a close-range knowledge of what our plant does, and of its ex-

tent. As an index of the importance that the company attaches to this work, more than half of the total number of employees of the Community Relations Division are guides who escort the visitors.

Particular emphasis has been given to inviting groups of community leaders. Such groups are usually scheduled for late afternoon, then remain for dinner in the restaurant and to hear talks by company executives. But a great deal of this ground now has been covered—after all, ours is not a metropolitan area. So we are broadening the invitation list. During recent months, for example, we have had many visits from college and high-school student groups. Interestingly to me, when the daughter of one of our executives made the trip as one of a high-school party, she returned home with a far better comprehension of Caterpillar operations, according to her father, than she had managed to absorb from him during the previous 15 years. Besides these pre-planned trips for purposes of community relations, we of course also have a great many factory tours by customers, dealers, business visitors, and tourists who merely happen along.

Responsibility for donation requests was centered in the Community Relations Division because such requests improperly handled can cause a good deal of needless friction. Disregarding the insignificantly small number of racketeers in search of donations, we may safely assume that every solicitor or letter-writer who requests a gift of money regards his as a completely worthy purpose. Whether it be a veterans organization that wants funds to assist disabled comrades, a parent-teacher association raising scholarship money to send promising but hard-up youngsters to college, a church needing cash to build an addition, or one of the recurring drives staged by approved organizations, the person making the request considers the outfit he represents the most important cause on earth.

Solicitors Received

Under our plan, solicitors are courteously and promptly received. The interviewer asks questions designed to obtain all of the pertinent facts, and subsequently makes any further investigations that seem necessary. Even when it is necessary to tell the solicitor that the company cannot contribute to his cause, a great deal of time and care is given to discussing it with him and making a careful explanation of our reasons for not being able to contribute. It is our hope always that whether we say yes or no, the solicitor will leave us understanding our philosophy and with a friendly feeling for us.

Our speakers bureau consists merely of a list in the Community Relations Division of those company people who can do a good job of presenting facts to an audience and who are willing to take on such an assignment. The prinicipal call comes from luncheon clubs, church societies, schools, and civic organizations. All talks to be delivered on subjects that concern the company are cleared through this division.

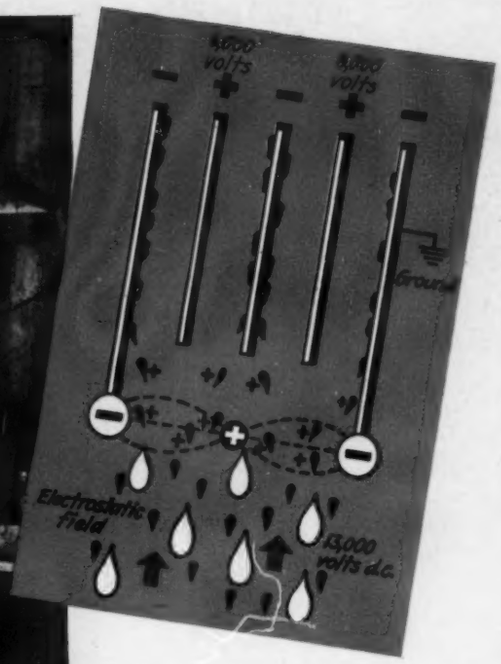
Our management sincerely appreciates the opportunity to have a company speaker meet with any serious group in the community. The speakers bureau on request assists any such speaker in gathering material for his talk. If he wishes, it will even assist in preparing the speech. It also knows where in the organization there are films, slides, projectors, screens, and operators available for use in such engagements. A recently inaugurated aid to speakers is a letter, published at irregular intervals and called " . . . from one speaker to another . . ." It carries briefed outlines of talks by speakers and other material of possible interest. This letter, photo-lithographed, goes to more than 150 company men.

The program outlined here has proved highly useful in building a friendly, warm feeling for the company among our fellow citizens of Peoria and adjacent territory. Those of us who have been here since the early efforts to better our company's standing with the neighbors know that a great improvement has been achieved. But we also know that this effort cannot safely be dropped, however great the progress. It must be a continuing activity as long as Caterpillar remains a growing organism in the community.

Technical films for schools are also good community relations. In this case, 14 were given to Peoria public schools for training

A late Spring snowstorm, with high winds, tied traffic in knots. Caterpillar equipment went to the aid of the State Highway Dept.

With hood up and slide panels removed, operating head of the screw machine is readily accessible. Precipitron and power pack are seen in background



Air passes upward through strong electrostatic field where particles of oil and other foreign matter receive a positive electrical charge, then up into collector cell. Parallel plates 5/16 in. apart are charged alternately positive and negative. Positively charged particles are attracted to negatively charged plates where they are precipitated, drip off into a drain, return to the oil reservoir

OIL MIST CAN BE ELIMINATED

By W. F. HERST, Plant Superintendent, Wolverine Brass Works and
H. B. HEYL, Consulting and Application Engineer, Westinghouse Electric Corp.

OIL MIST created by automatic screw machines can be eliminated by electrically precipitating the oil out of the air. At the Wolverine Brass Works, Grand Rapids, Mich., a Precipitron electrostatic air cleaner has done this so well that the savings in maintenance—cleaning the ceilings, girders, lighting fixtures, pipes, ducts, columns, machines, floors—plus the cooling oil recovered will pay for the installation within twelve months. Another important benefit is the improved working conditions that result from cleaner surroundings and air free of oil contamination.

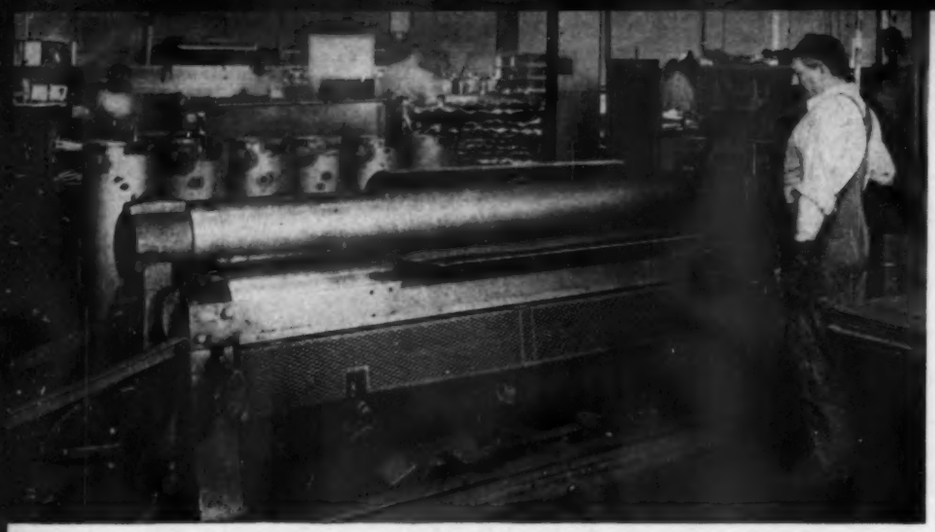
The secret to this installation is to be found in the type of hood built for the operating head and setup space of the screw machine and the ducts leading to the Precipitron. The hood is built as air tight as possible to assure proper flow of air and the ducts are inclined to allow condensed oil particles to drain back into the circulating tank.

The top of the hood is hinged so it can be raised above the operator's head. Hooked rods of adequate size hold the hinged hood up. The lower side panels are easily removed. A lamp in a vaporproof fixture gives light for setup or for inspection through the window in the end panel when the hood is down and the machine operating. The shape and weight of the hood hold it, and the side panels, securely in place when it is down.

A screw-machine room without oil mist? This company has one, and savings in oil and cleaning will pay for it in the first year

Two ducts are run out of the cage, one from each side near the top. These converge at the bottom of the Precipitron. A fan in the top of the Precipitron draws air through openings in the bottom of the cage, up past the oil vat and chip conveyor, through the working space into the two ducts and precipitator cell where the oil is completely taken out of the air and returned to the circulating tank. The clean air is exhausted into the room.

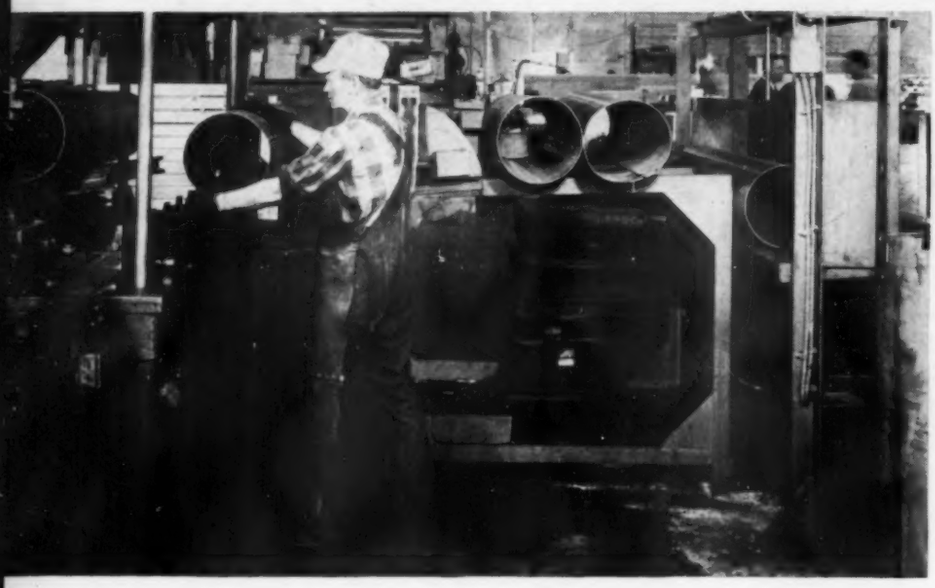
During a typical 8-hr. shift, 3 gal. of oil is returned to the circulating tank from the Precipitron of a single screw machine. At least 150% more oil than this was formerly thrown into the room and lost. The hood now saves a major portion of this, so that the total saving is 7½ gal. per machine per 8-hr. shift. The cost to make this saving was $372.60 per screw machine for electrical equipment, $175 for cage and ducts. The power pack, which serves four Precipitrons, consumes 90 watts. For a normal 8-hr. day, approximately three-fourths of a kilowatt-hour would be required to operate the Precipitrons for the four machines.

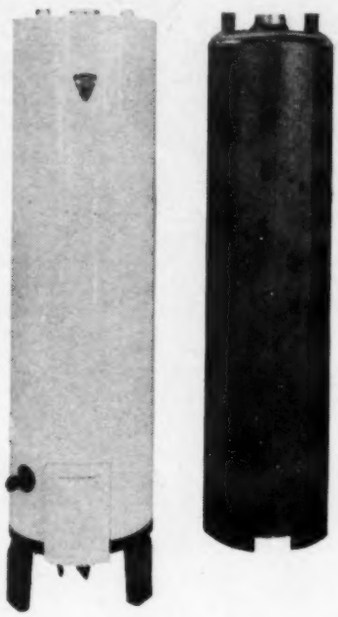


SHOP SHOTS

AT DAY & NIGHT

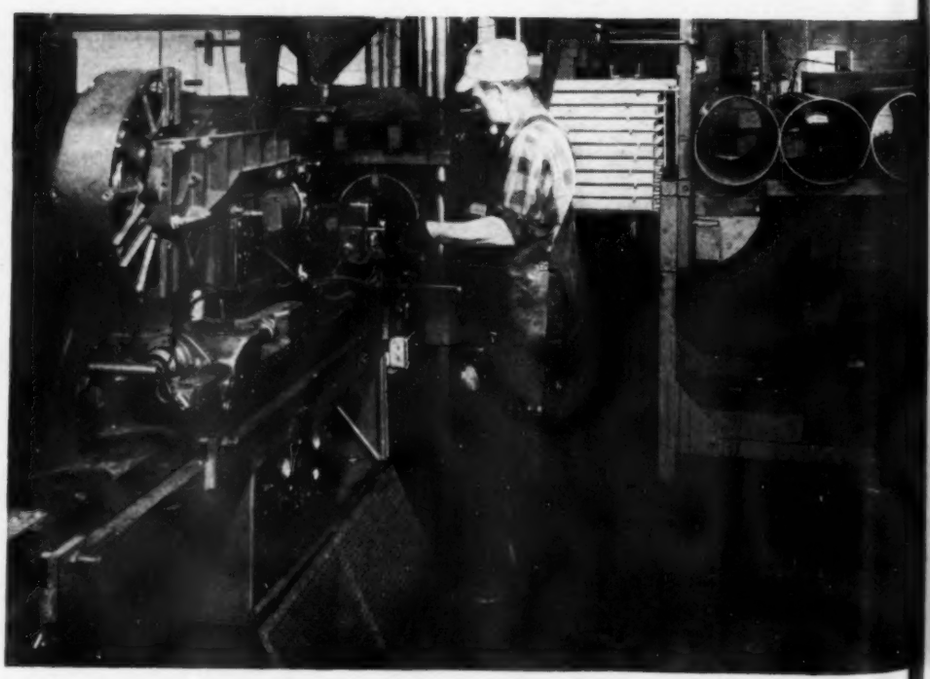
BOILER SHEETS are pre-crimped along the joining edges to form them to cylinder size as fabrication starts. After the shell is rolled it is tacked at the firebox end with an oxy-acetylene blowpipe



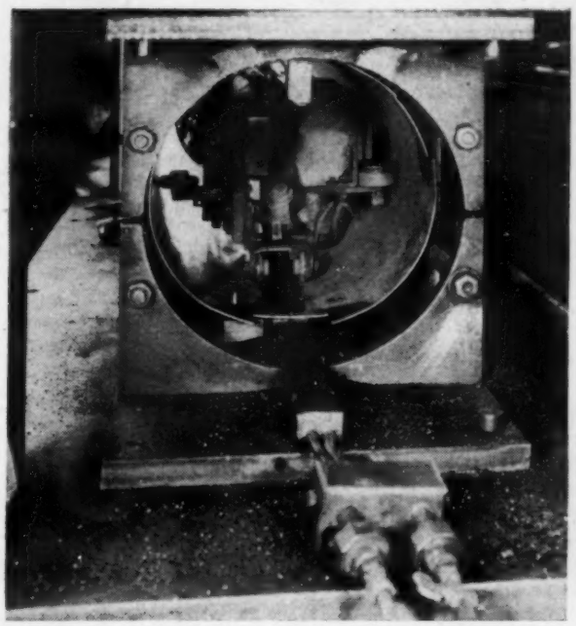


FEEDER PLATFORM is loaded automatically by the elevator at right. As the upper clamp of the welding jig on the left rises, it picks up the boiler shell and a removal chute automatically extends under the shell to roll it into a wall. Various diameters of shells can be accommodated by changing the upper and lower half clamps on the welding jig. A hole in the firebox end fits over a locating jig pin to align the seam

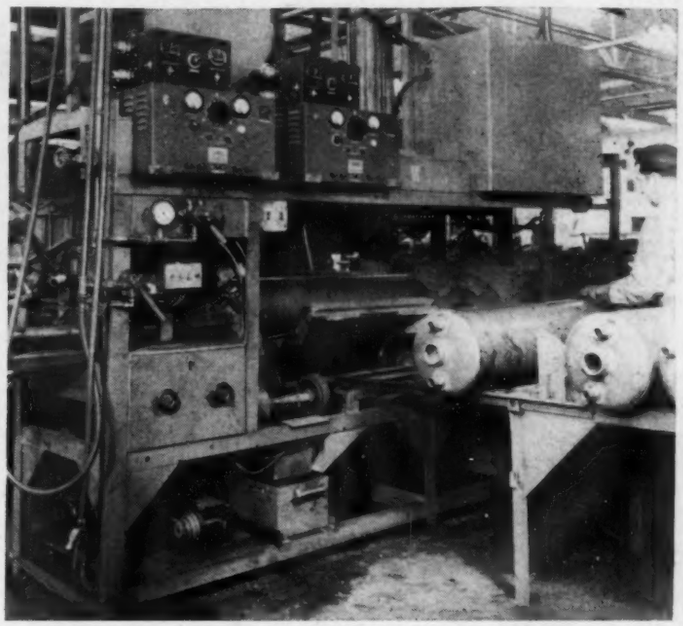
LONG EXTENSION on welding machine is run into the shell after the jig is closed. One of the two limit switches at the rear of the welder carriage stops the welding when the welding has progressed onto the stopping tab which the operator positions at the end of the seam. The other limit switch stops travel. Welding rod is fed through a concentric tube supported on insulators and Unionmelt material is fed from container to jig frame



AUTOMATIC WELDING puts manufacture of 20-gal. water-heater boilers on a production basis at Day and Night Manufacturing Co. in Monrovia, Calif., with a minimum of space and welding units. Unionmelt machines weld longitudinal seams in the water boiler shell and the circumferencial seams attaching the head and bottom to the shell. The setup is versatile and designed to handle shell gages from 14 to 10, in diameters from 12 to 16 in. and up to 60 in. in length. Welding jigs and feed arrangements are also adjustable



NOMINAL POSITIONING of the rod, as the weld is started, is made by the attachment on the left and two sets of guide wheels stabilize the arrangement. Locating pin is at the bottom and left of the weld and a water-cooled chill bar runs underneath the shell joint to be welded, with connections in the foreground. All guide wheels are insulated



BOTTOM and FLUE ASSEMBLY and the upper head are pressed into position after the shell leaves the seam welder. Head and bottom welds are made simultaneously using a starting and timing device. An air valve positions both welding heads and "ground" dolly. The discharge skid is shown raised and is lowered when welding is complete so that the tank may be rolled away. Gear reduction regulates the speed of the turning rolls

WELDING MATERIAL flow is started as the heads are in position, the operator opening an air valve and closing the contactor switch. The remainder of the cycle is automatic, the bottom assembly being welded in the foreground and the head at the left and rear. Following this the flue is welded to the top and the thermostat and drain couplings attached. The boiler is then tested for leaks and galvanized. The completed assembly is on the preceding page

Carbide Dies Cut Laminations

Press efficiency runs as high as 75% when progressive and compound dies with carbide cutting members are used. Thus, higher costs of the tools are offset by less regrinding and longer service

BY RUPERT LE GRAND
ASSOCIATE EDITOR

THE "chips are down" on carbide dies for sheet metal. And experience in designing these tools has gone a long way in the past year.

The case in point is Lincoln Park Industries, Inc., Lincoln Park, Mich. This firm has today the largest known investment in grinding, diemaking and inspection facilities for producing progressive and compound dies with carbide cutting members.

Fate and aggressive management joined hands in this enterprise. Lincoln Park had built up its facilities to meet wartime needs for carbide gages and gage blocks. It had broad experience in grinding carbide and working to precision-gage accuracy.

But George Eglinton, president, and D. J. Woodworth, chief engineer, were not content to take a postwar backseat. Instead of merely competing in the gage field, they rearranged the shop to handle both dies and gages.

A year ago, carbide dies had to be built on speculation. Today that is out. Major companies are ordering carbide dies because the higher cost is a good investment, considering the extra millions of hits and freedom from downtime that can be gained. As proof of this statement, consider the design of several dies that Lincoln Park is now making or has recently completed for several large customers.

Two Blanks at a Time

Progressive dies have been made for several types of laminations. The pierce and blank die, Fig. 1, is a duplicate of a steel die, except for the method of attaching the carbide members. Two blanks are produced per stroke with this tool.

Chief consideration in design was to section the carbide parts for ease of grinding and adequate strength. Eight sections were found necessary in the die portion (for the two stations).

Section 1—Holes *A* are far enough apart to allow jig grinding the preformed holes and using carbide inserts. These can be changed if chipped or the hole size is altered. Bushings are a light press fit.

Section 2—Horn *B* is probably the weakest portion of the die. It would have been desirable to eliminate the horn by piercing a slot at section 1. This was impractical because w_1 and w_2 must be held equal, to maintain size and uniformity of the two ears on the blank. Heavy backup plate *D* and shoe *E* give adequate support.

Principle of Sectioning — Besides considering strength of the section shape, consideration must be given to ease of grinding. Where possible, preforms are specified with a 0.020 in. grinding allowance. Even so, carbide is ground with diamond wheels; it is desirable to choose cutting-edge outlines that are easily reached while the parts are set up in fixtures on surface grinders.

Piercing holes *C* and sections 5, 6, 7 and 8 are duplicates of elements at the first station.

Sections were assembled and the periphery ground for a light press fit in the pocket.

Punches—These are shorter than customary with steel dies. The ¼-in. grinding allowance is ample — the shorter punches are stiffer. Height thus saved is added to the backup plate and shoe thickness, so these members can resist the battering of longer runs than customary with all-steel dies.

Piercing punches are backed up by hardened parts *F* and setscrews. This construction allows ready replacement of punches.

Blanking punches, *G*, are a size-to-size fit in conforming steel punchholders. This fit is such that no light is seen after assembly, but no pressure is applied to set up unequal stresses in the carbide. Clamp *H* holds the punch firmly in its nest.

A pilot pin operates within the

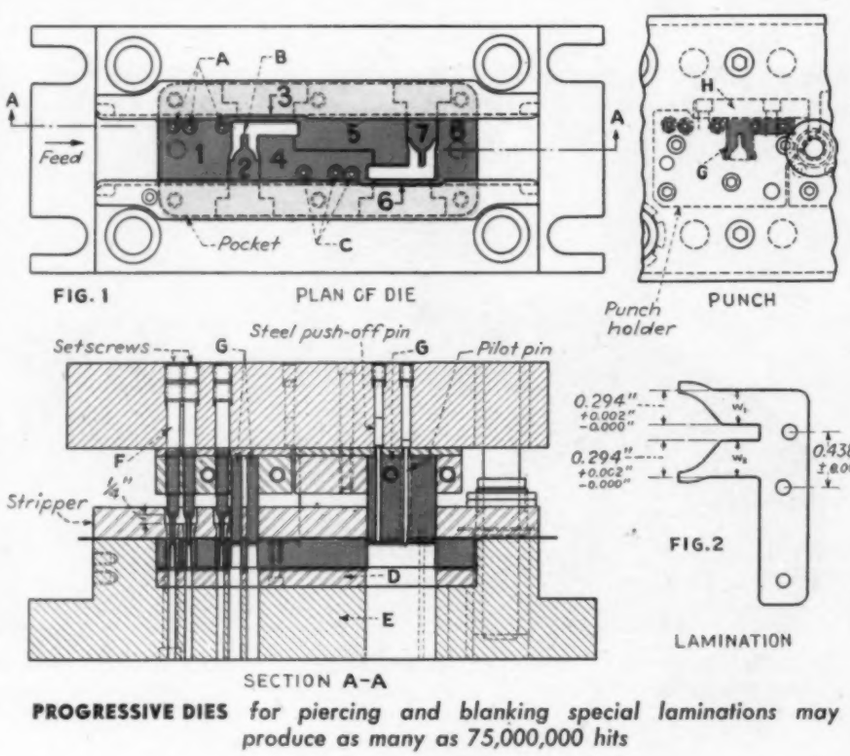
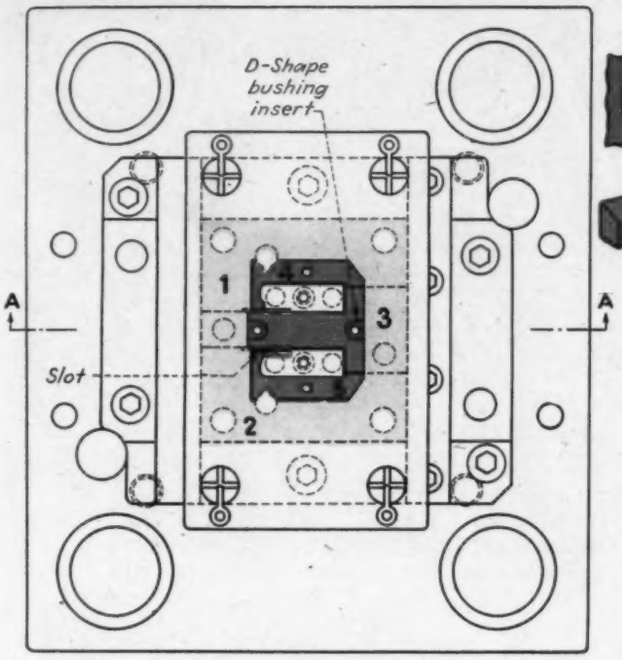
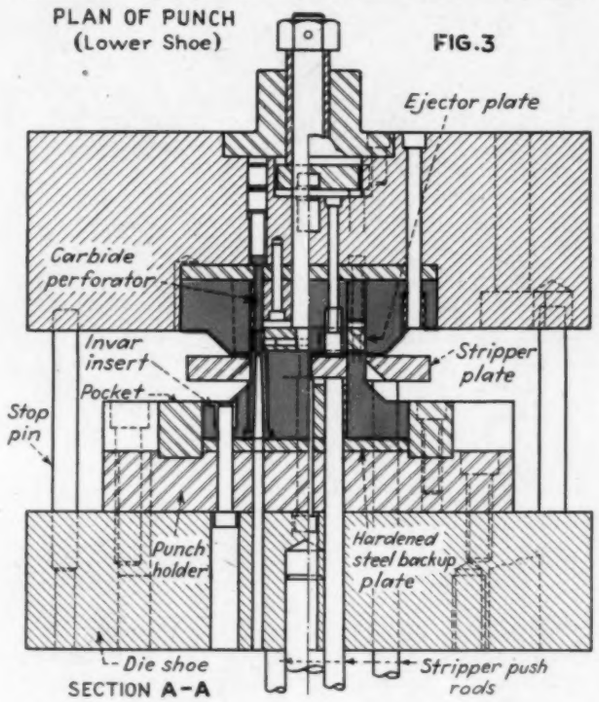


FIG. 1 FIG. 2

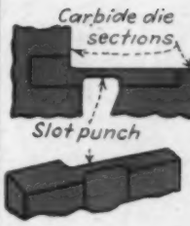
PROGRESSIVE DIES *for piercing and blanking special laminations may produce as many as 75,000,000 hits*



PLAN OF PUNCH (Lower Shoe) FIG. 3



SECTION A-A



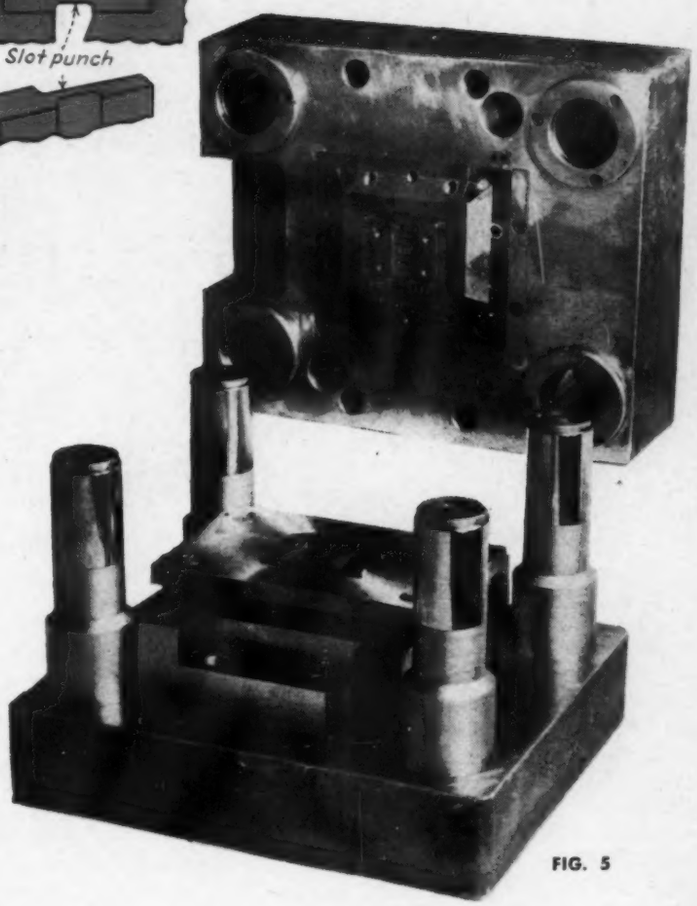


FIG. 5

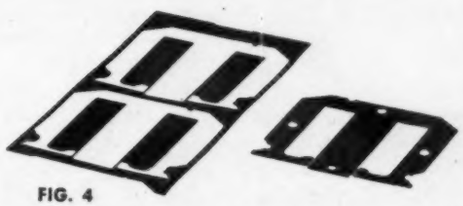


FIG. 4

COMPOUND DIES *often require massive pieces of carbide preformed in sections to permit grinding. Mechanical methods of attaching the carbide parts avoid setting up strains. Invar inserts in punch sections are tapped for hold-down screws*

blank punch. The hole in the punch is preformed for clearance except at the lower end. Here the hole is ground for a good fit.

A second hole through the blanking punch is merely lapped after preforming, to act as a guide for the steel push-off pin.

Stripper Plate—The four guide pins and close-fitting bushings keep the stripper plate in alignment. Clearance in the steel bushings for the piercing punches is one-half that of the die bushings. The latter have customary steel die clearance. No guides are required for blanking punches; they are stiff enough to support themselves without trouble.

Punch-Holder—All holes in the punch-holder are jig-bored in accurate relationship. At assembly, the holes in punch-holder and stripper plate are carefully aligned and the punch-holder is screwed and doweled to the shoe.

Die-Set—The guide pins are somewhat unconventional. They are chrome-plated and are taper pin expanded into a hardened steel bushing in the punch-holder. Guide pins run in hardened, ground and lapped steel bushings in the die shoe. Large guide pins are desirable, but the press must be in accurate alignment.

Now—Compound Dies With Carbide

Until lately die designers have shied away from using carbide members in compound dies. Reasons: (1) frequent need for large, thick sections of carbide, (2) complexity of compound dies. These considerations are drawbacks no longer. Massive carbide pieces can now be preformed; methods for attachment without causing internal strains have been worked out. (*AM*, p. 137, July 17, 1947).

A compound die recently made for a large meter manufacturer (Figs. 3

FIG. 6

PUNCHES *never leave the stripper in this full pierce die for a stator lamination. Die segments must be machined to a tolerance of 25 millionths*

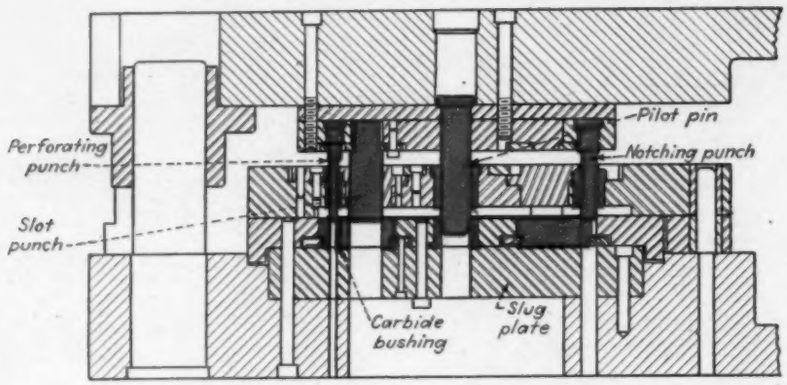


FIG.7 SECTION THROUGH STATOR PIERCE DIE

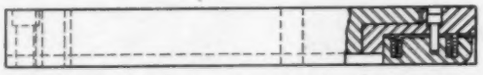


FIG.8 SPRING PRESSURE PAD IN STRIPPER PLATE

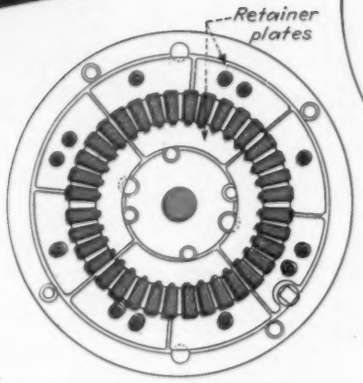


FIG.9 PUNCH ASSEMBLY

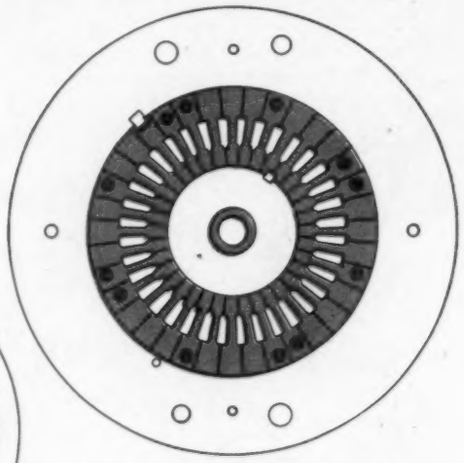


FIG.10 DIE CASE AND DIE SECTIONS ASSEMBLY

and 5) pierces and blanks a meter lamination from silicon steel strip. Original considerations of the design of this die for carbide application centered on the 0.027 thick punch inserts (Fig. 3) required for the two gaps 0.028 wide in stamping (Fig. 4).

The relative thinness of these inserts seemed to be the chief hazard to a successful application and it was decided to test the application by inserting carbide inserts in one of the present steel dies. This was done and the carbide sections proved their strength through four runs of the die. The success of this experiment was the deciding factor in the decision to produce a new die made with carbide sections for all cutting edges. Design of the steel die was duplicated (including clearances) except for the changes required to hold the carbide sections.

Details are:

Punch (lower shoe)—This is a 5-section "package" screwed and doweled to the lower shoe. Screws engaging Invar inserts in punch sections hold them securely to the hardened backup plate and the thick punch-holder. A pocket prevents spreading of the sections, which are a light push fit.

Since two perforating holes (at accurate centers) must be provided in the punch, two D-shaped bushing inserts are used. These bushings can be replaced readily if chipped or the hole size is changed. A D-shape was selected for the bushings to avoid grinding a part round hole in the containing punch section and producing a resultant weak feather edge. Two other perforating punches operate in ground holes in sections 4 and 5.

Die (upper shoe)—Eight pieces of carbide form the die. Slot-punch inserts are dovetailed in place, because this is the only satisfactory method of retaining them. No warping occurred when grinding these punches—a feature of carbide.

Heavy Carbide Sections — Comparatively massive sections of carbide can be performed to reasonable grinding tolerances. Hence, it is preferable to avoid built-up, or layer, construction by brazing, which is likely to introduce thermal strains.

General Construction — The carbide die sections are built into a heavy "house"—heavy shoes, oversize guide pins. If any height is saved by reason of reduced height of carbide cutting members (½ or ¾ in. thickness is often adequate for many regrinds and adequate stiffness) any height so saved is added to backup plates and shoes.

Where Accuracy Counts

Stator-lamination dies (steel) require a high order of diemaking skill. But when segmental carbide construction is substituted, the work ascends to the gage-making category.

For a stator pierce die like the die shown in Figs. 6 and 7, the 36 wedge-shaped die segments must assemble in a true circle around a center plug. This means that segments must be held to a tolerance of 25 millionths for thickness and angle. This is accomplished by grinding and lapping the sides to such accuracy that segments will actually wring to fixtures used on surface grinders.

This die slots and perforates a preblanked cookie, and the construction is intended to prevent double feeding. Cookies are fed one at a time from a stack, are pushed approximately to the center of the die, being held by a spring pressure pad, Fig. 8, in the fixed stripper plate. When the ram descends, a large pilot picks up the center hole in the blank and centers it in the die. Features of the tool are:

Stripper Plate—Of fixed construction, the stripper plate incorporates shouldered carbide guide bushings for all perforating punches and the notching punch, and also segmental steel stripper sections to support the slot punches. Bushings and segmental sections are fitted with 0.0004 in. clearance—one-half the die clearance of 0.0008 in.

Punch-Holder—Slot punches have 0.002 in. float in punch holder, are held in position by retainer plates, Fig. 9. The press has only 1-in. stroke. Hence, slot punches are always held in alignment with die openings by the close-fitting fixed stripper plate.

Perforating punches are shouldered, do not float. Both perforating and slot punches are backed up by a hardened steel plate.

Die Section — Segmental carbide die sections, Fig. 10, are a light shrink fit in the die case (0.003 in. on I.D. of case). Holes for the perforating and notching punches are bushed. The carbide bushings are shouldered to provide greater bearing area on the slug plate, to avoid Brinelling the latter.

Guide Pins—Only two large guide pins are used because the stripper guides the punches.

General Construction—Carbide die sections need be only ¾ in. thick for adequate stiffness and grinding life. Punches are comparatively short because of short stroke and adequate alignment by stripper plate. Hence, in "duplicating" the design of a steel die, the height saved on those elements was added to the thickness of the backup plates and shoes. Thus, the carbide cutting members were more effectively "housed" in a stiffer over-all die construction.

5 Laminations at Once

A progressive die, Fig. 11, now under construction for a large automobile company will blank five starter laminations at a time.

Station 1—Slots and center holes are pierced at this station. Five "package" segmental-carbide die units are shrunk into a steel case. The cases are inserted in a steel dieholder plate let into the die shoe, and they are located with keys. Any package is easily removed for servicing if a carbide die segment is chipped.

Station 2 — The laminations are blanked. Each die "package" consists of a carbide ring shrunk into a steel case. The five cases are likewise inserted in dieholder. Thus, ten cases in all are inserted in the dieholder.

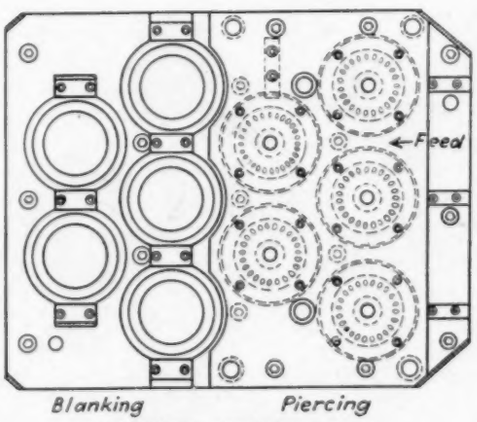
Stripper Plate — Composite construction is used. At the piercing station, a solid stripper is fastened to the dieholder. For Station 2, a spring stripper is used. It does not guide the punches, whereas at Station 1 the punches are guided by steel segments.

Punch Assemblies — Slot punches are built into a package unit. They are fitted to a spider and retained by a steel ring shrunk in place.

Carbide vs. Steel Punches

The comparative difficulty in respect to making steel and carbide punches is illustrated by details *A* and *B* of the stator die, Fig. 12. This is a two-station progressive die. The stock is blanked against a spring pressure pad, two pieces at a time, at Station 1. A push-up pin returns the blank to the strip, after the stripper releases. Thereupon the blank is moved in the strip to Station 2, where it is ejected.

Carbide blanking punches are required at Station 1. They are made a size-to-size fit in the split nest (steel) and are retained in place by a nut bearing against a flat or keyway. In contrast, the steel punches at Station 2 operate in die openings 0.005 in. larger than Station 1. The blank is merely pushed down through the opening. But the die opening is made to the part outline in order to pre-



SCHEMATIC ARRANGEMENT OF STARTER-LAMINATION DIE

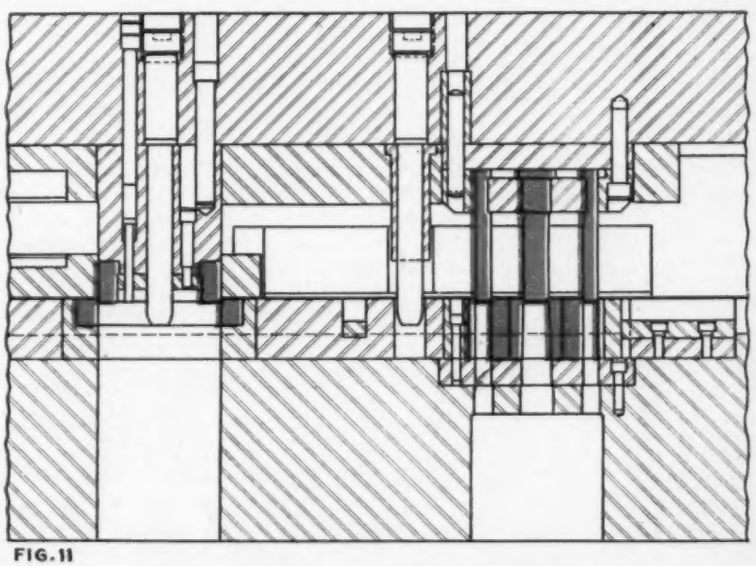


FIG. 11

OVER-ALL SIZE *of this starter lamination die exceeds that of earlier tools. Five blanks are produced per stroke. All 10 die sections are made as packages that are pocketed in the dieholder*

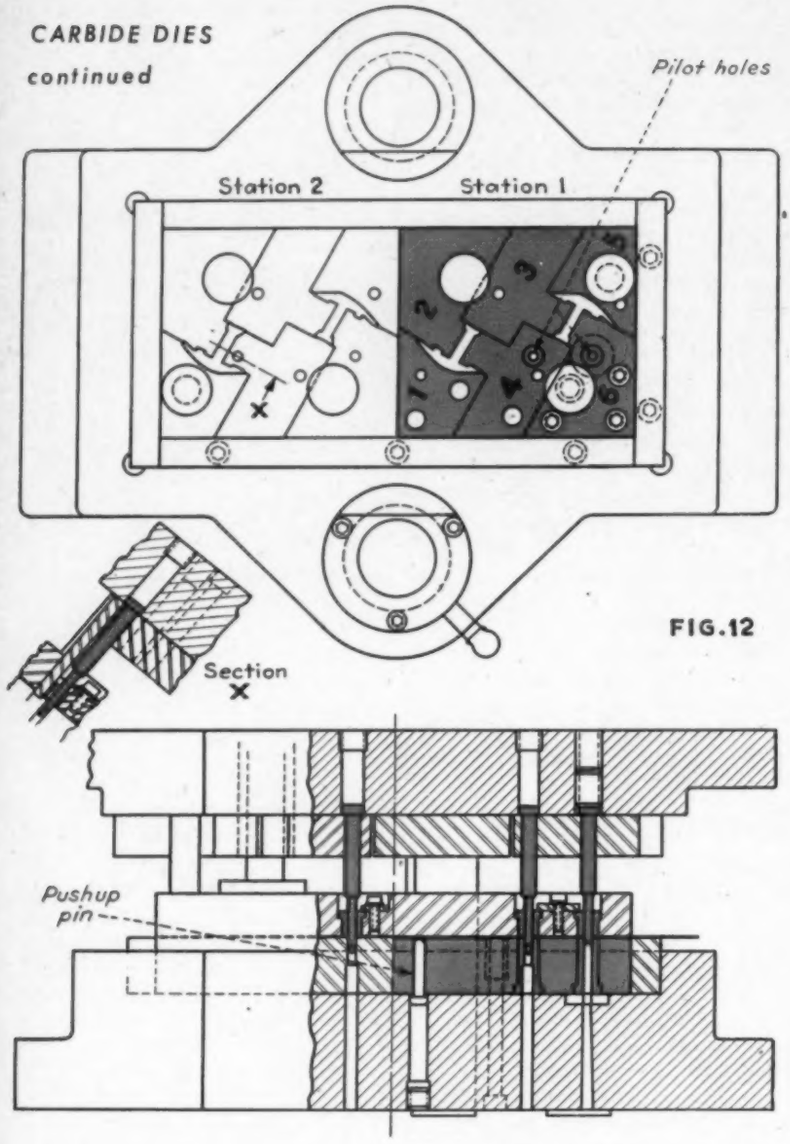
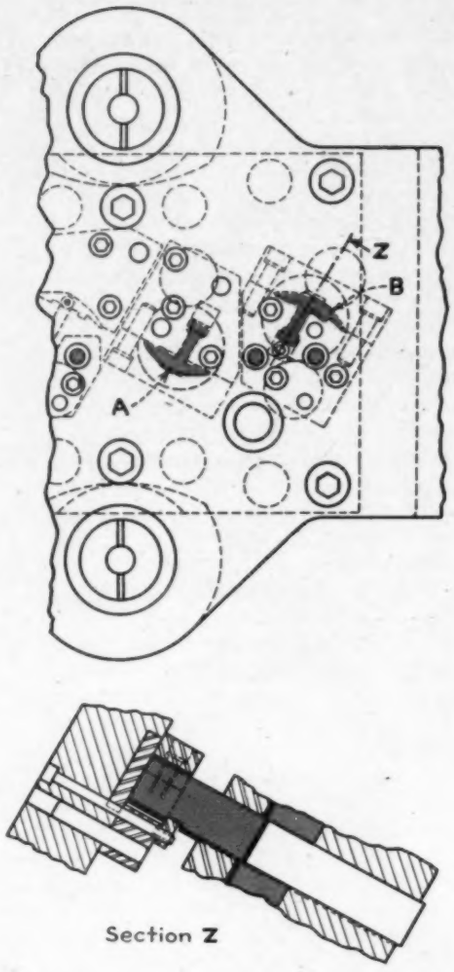


FIG.12



IRREGULAR-SHAPED PUNCHES *as in this progressive die must be made a size-to-size fit in the retaining nest, or pocket. Die sections must be made to gage accuracy so that surfaces blend perfectly at junction points*

vent deforming of the fragile piece.

Die Sections— Careful workmanship is required in making the six carbide sections that comprise Station 1. Eight stacks of stator laminations must assemble properly for a special motor. Note how these sections are laid out to permit surface grinding the outlines with a succession of flat and radiused diamond wheels. Accurate workmanship is required because all of the sections must assemble so that matching points are undiscernible to the eye, and so that the assembly can be press fitted in a steel housing.

Carbide is employed for the pilot-hole punch and the pilot pins. These elements are guided in carbide bushings in the stripper plate. In the die section, carbide shoulder bushings are fitted for openings to receive the pilot-hole punch and the first pilot pin. The shoulder is used to prevent possible Brinelling of the backup plate or die shoe.

The tools described show that progressive manufacturers have faith in complex dies with carbide cutting elements. But there is no reason for limiting the use of carbide dies to high-grade work like laminations. Economies in press operation can be achieved with simple dies too.

SEEN and HEARD

By JOHN R. GODFREY

Caterpillar Born Too Soon

NEWS HEADLINES tell of a new army plane with caterpillar landing gear that can land on soft ground, mud or sand and without a landing strip. Sounds O. K. and makes me wonder why it hasn't been done long ago. Because, shortly after World War I, in 1919 or 1920, Glenn Curtiss took me up in his drawing room at Garden City, L. I., and showed me a layout for a bomber with a caterpillar landing gear. It was a huge ship for those days and was of course a biplane, which was then the vogue. But the new landing gear was all drawn up and looked much as the illustration shown in the daily papers. I am quite sure this plane was never built, but it is simply another case of a good idea being born prematurely. There was talk of such a landing gear during World War II, but this seems to be the first plane actually to be equipped with caterpillar treads.

Here again is a case of an idea born too soon for acceptance. Just like so many others, it was reborn when the time was ripe.

TALKING SHOP

Cold Extrusion Advances

COLD EXTRUSION of steel is advancing by leaps and bounds. Modified from German developments, this process gives accuracies to 0.0004 in., cuts material requirements 50 to 70%, machining requirements as much as 90% on certain types of parts. Even core holes of desired shape and dimensions can be extruded. . . . A concurrent development in forming carbon-steel sheet, also German-inspired, permits deep draws to close tolerances. Chemical pre-treatment with phosphates creates a tough skin that lubricates the die, ups drawability 20%, and protects surface during processing. Stainless-steel half-barrels for beer are now drawn this way. Weight is one-third that of former oak kegs.

Breakeven

BREAKEVEN POINTS have a way of rising during lush times and resisting shrinkage when times get tough. One turbine builder recently reported a breakeven point in 1939 of 60% of capacity: now it's 80 to 85% of increased capacity. Among other causes is 200% enlargement of the accounting staff—added government reports and such. . . . Executives are squeezing now, give as their example the shipbuilder who had a building-full of records, prints, etc., that required 300 employees. The building burned down—and nobody ever missed the records.

Smooth

MICROFINISH specifications for auto parts are constantly revised as engineers learn the relationship between surface roughness and operating conditions for specific parts. Valve-guide holes have been reamed, the idea being that a smooth surface resists wear. But now proving-ground tests disclose that much longer wear and reduced oil consumption result when the I.D. is finished to as much as 80 rms. by precision boring.

Getting Readership

ONE GOODSIZED COMPANY reports no success in getting workers to read printed matter on company affairs, hence is shifting to sound-slide films. . . . By contrast, another company in the same town called workers in recently, offered a 12-cent raise and suggested a 10% increase in production. The works manager's talk was mailed to each worker with a personal letter from the president. The next month, shipments were better than ever, prices were down, and costs were down—because the employees cooperated. An incentive in the latter case is a bonus system through which 2000 workers split a kitty equal to the stock dividend. The base is a point system considering seniority and wage rate. Last year, each worker got 5 to 6 extra weeks pay.

This Light Didn't Fail

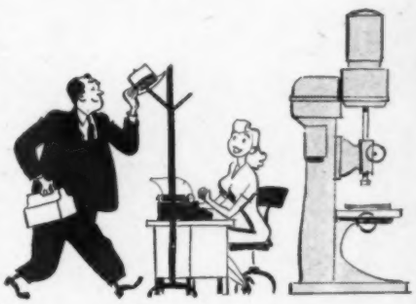
PRECISION MACHINING (to produce serviceable parts as they leave the turning or boring machine) will probably take long forward steps in the next few years, because of the process-engineering work done on the light Chevrolet. Although this car will not be marketed, the engineers learned a great deal about tooling up for minimum operations per piece.

Training Can Help

TRAINING of present-day shop workers may well be just as important as it was during the war. The man who ran the Bullard for 16 years before the war did not return to his job. His place was taken by a man who works harder but produces less because he does not know enough about how to get the most out of his machine and what to do to keep it in best operating condition. The answer, now as always, lies in job training and in building employee morale.

Boring to Contour

CONTOUR BORING is being taken up in the auto industry as a way of doing several operations at one chucking. Specifications for undercuts, tapers, radii, and blended surfaces are being met successfully on parts like hydraulic-valve lifters.



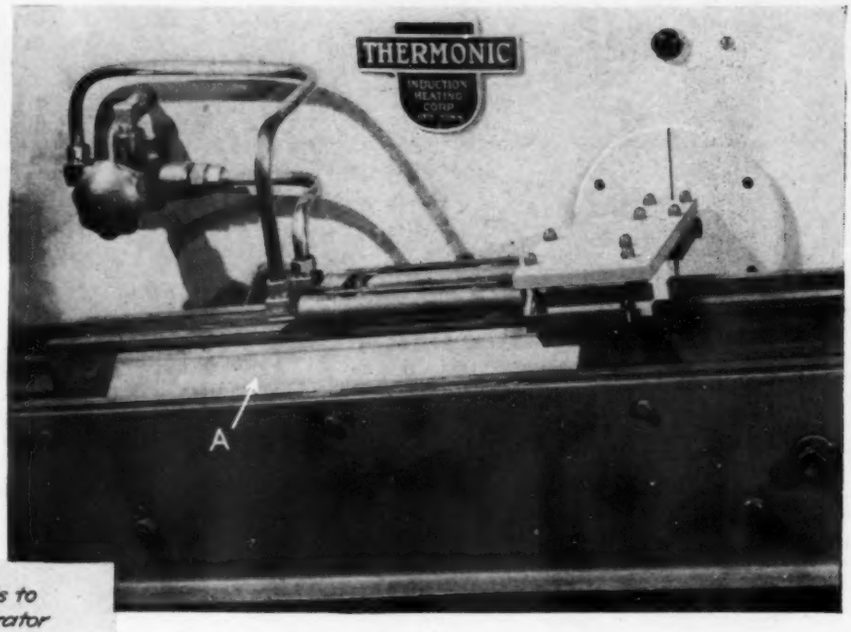
Subcontract Operators

TO SQUEEZE OUT of the pinch between high material and labor costs, a small Cleveland shop has put every operator into business for himself. Each man owns his own machine, quotes his price for each job. George Zerby and Edward E. Ranney run the company, called the Market Specialties Co. They get orders, buy material, handle billing, collections, route work, handle shipping, furnish the building, heat and light. Thus far, products have been gear blanks, sprockets and pulleys; but they expect to have 15 big tools soon. Operators say they've doubled hourly income, can work any hours they please.

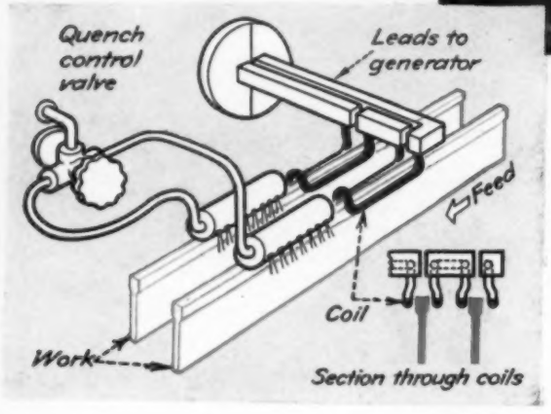
Machine Leasing

ONE MACHINE-TOOL BUILDER now is leasing flute grinders, with considerable success. Here is the key point: *A rented machine cannot be purchased.* If the lessee wishes to buy, he must buy a new machine. Rental builds up no equity, and a rental machine cannot be bought cut rate.

LAWNMOWER CUTTER BARS . . Edges of bars only are hardened. Two pieces are hardened simultaneously at a feed of about 10 ipm. Work, carried through the coil on a chain conveyor, is heated about 4 in. at a time, then passes into a water-spray quench at left. Parts are loaded end to end, so heating is continuous. Over-all length of a bar is shown at *A*



CUTTER-BAR SETUP . . Two hairpin coils, series connected to bus leads, are supported by brass studs under a transite plate (not shown) to provide rigidity. Spray quench tubes are directly in line. Work relationship is also shown in the sketches below



LONG PIECES CAN BE

Distortion cut, hardening controlled, by

BY FRANK W. CURTIS
INDUCTION HEATING CORPORATION

WHILE induction hardening is used largely for the treating of small and medium-sized parts on which only the surface, or a given area, is heated simultaneously, followed by either a spray or immersion quench, the same process lends itself equally well to a wide variety of progressive hardening operations on comparatively long parts. Work to be treated usually is fed progressively through an induction heating coil, arranged so only a small area of the part is heated at one time. Then, as the workpiece progresses through the coil, the heated portion passes through a spray quench, or into an immersion bath, as may be desired or required by the job.

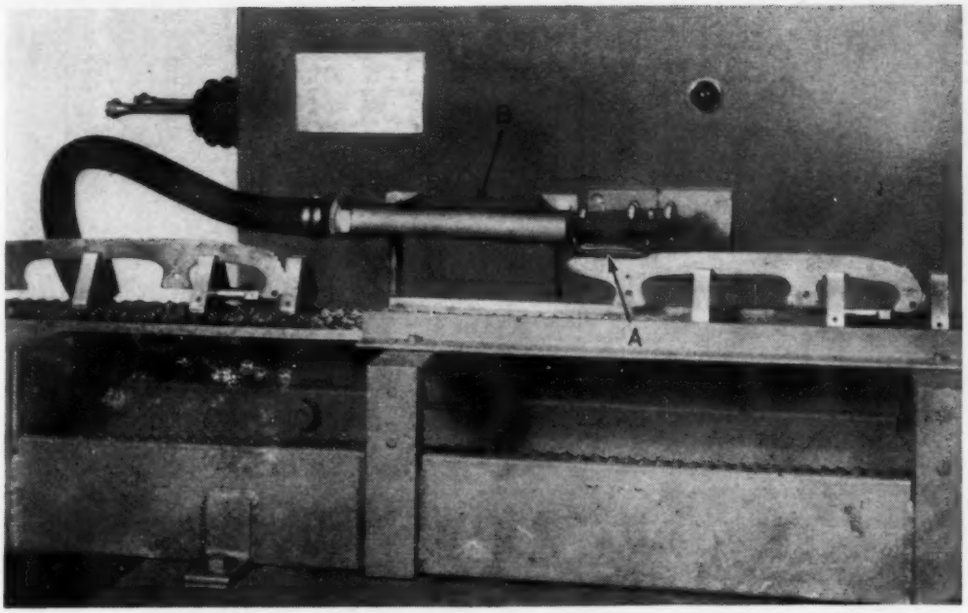
Advantages of progressive induction hardening are: (1) a high-frequency generator of limited power can be used to process long parts which normally would require a more powerful heating unit, and (2) a part so treated as a rule is hardened with far less distortion than if it were heated all at once by other means. Heating control is closer, so a more uniform over-all hardness is maintained. With induction heating, experience has shown it is easier to heat progressively a small area than it is to heat simultaneously a long surface, because better electrical loading characteristics result. With induction-heating coils, there is also a limit of coil length in relation to diameter, at which uniform heating becomes difficult, so progressive heating is the only alternative.

Not Difficult

Progressive induction hardening is not particularly difficult to carry out, if the work lends itself to the method of treatment. The problems involved usually resolve themselves around a suitable feeding mechanism. For some operations, a conveyor or sliding table can be used, whereas for others it may be necessary to provide a special progressive-feeding unit or machine. With this is the heating coil itself, which is usually of comparatively simple design and readily made.

Progressive induction hardening has many advantages over conventional methods in the handling of long parts that lend themselves to this method of treatment. The reduction or elimination of warpage is outstanding. Speed of heating far exceeds other methods, so production possibilities become attractive. Depth of case can be controlled as a function of feed rate and power input, and scaling is reduced or avoided.

Quality can often be improved because heat can be accurately confined with uniformity. Heat can be restricted to desired areas without affecting the ductility of adjacent areas, usually reducing over-all heating cost. Sometimes experimentation is required before results are achieved, but by having available suitable handling equipment, or ideas like those pictured to draw from, progressive hardening is not particularly complicated as a production process.

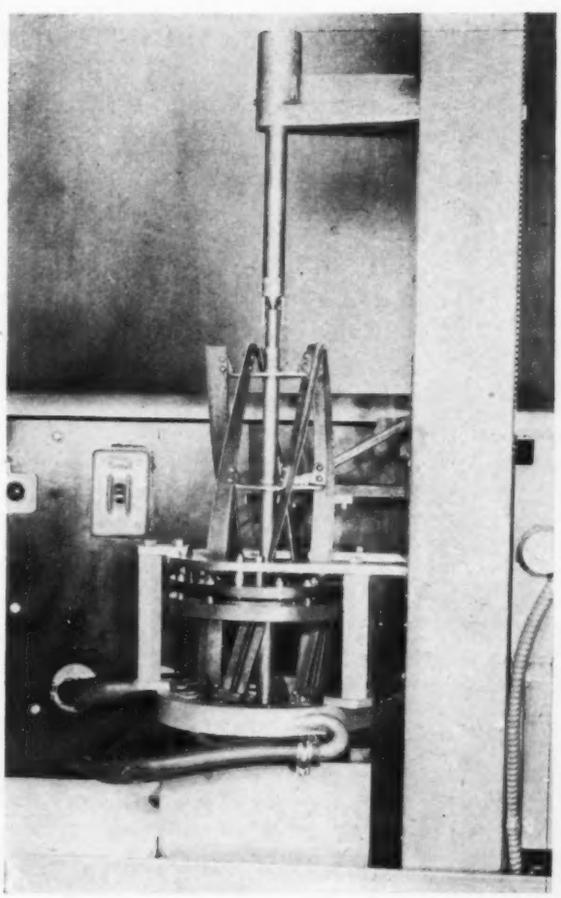


ICE-SKATE RUNNERS . . Blade edges are induction-hardened progressively on a chain conveyor provided with locating blocks to align and hold blades vertically. The blade is fed through a single-turn induction coil *A*, then through an oil-spray quench *B*. A hood and exhaust fan carry off fumes, while oil is recirculated through a heat exchanger. Hardened blades drop off the left conveyor end, so the operator need only load. Work-locating blocks have interchangeable studs, so can handle a variety of sizes and lengths. A 20-kw. output generator is used, and production rate is 300 to 500 parts per hr.

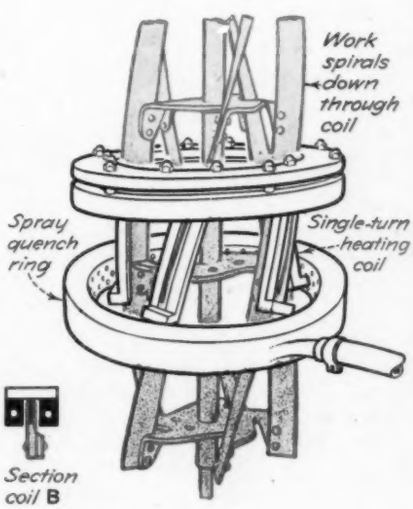
INDUCTION-HARDENED PROGRESSIVELY

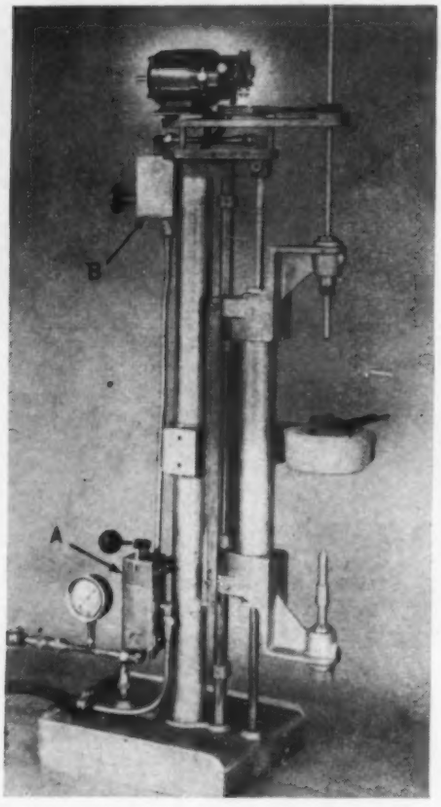
feeding long work through coil and quench

LAWNMOWER REELS . . Hardening thin blades before assembly caused considerable distortion which caused difficulty in assembling them to spacers. Soft formed blades can now be assembled to spacers, then progressively induction hardened. The assembled reel is located on centers, mounted on a vertical slide and fed downward through a series coil and spray-water quench. Heating cycle for this reel is 28 sec. The table has two stations (right one shown) so one can be loaded while the other is hardening an assembly

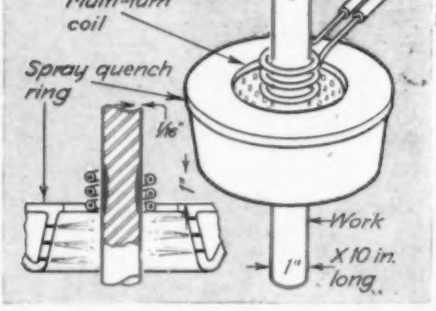


REEL SETUP . . Five series-connected loops, as sketched, correspond with blade spiral on the reel. The reel is spiraled as it feeds through the coil by means of a finger which contacts one blade. Blades are hardened only about ⅜ in. back from their edges (section *B*), to provide added ductility from the unhardened area. The unit is controlled by a multi-stage coil which energizes the coil, engages the feed, applies the quench, and rapid-returns the reel for unloading

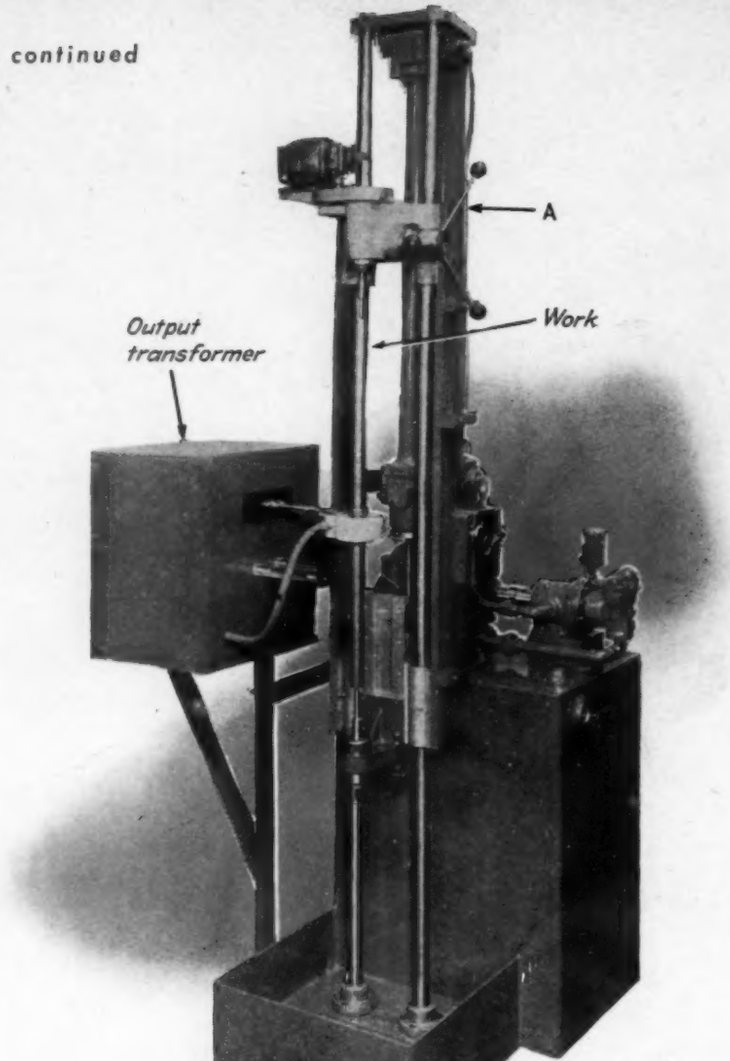




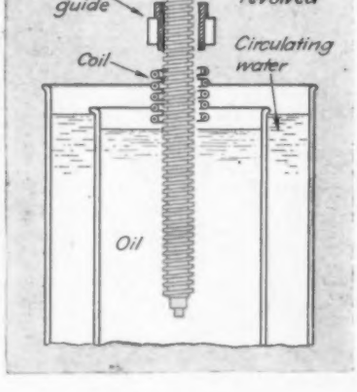
FOR LONG, THIN WORK ON CENTERS . . This small hydraulic progressive feeding unit can harden long pins, light shafts and other thin parts up to 12 in. long requiring extended hardened areas. Parts are mounted between centers, adjustable for work length, and fed through coil and spray quench. The upper center is motor-driven so work can be rotated if desired. The lower center is a ball-bearing type, spring-actuated to facilitate loading. Other controls include 4-way valve *A* and a feed-rate valve *B*, arranged with a rapid-traverse bypass



TYPICAL CENTER SETUP . . A sub-press guide pin (C-1144), is case-hardened 1/16 in. deep and water-spray quenched on centers. Only about 1 in. of the pin is heated at once, which with rotation during heating, insures uniform heat distribution so the guide pin is hardened with practically no distortion, reducing necessary allowances for subsequent centerless grinding, and cutting cost



FOR HEAVIER, LONGER WORK . . Suited to heavier parts up to 3 ft. long, this hydraulic-feed unit carries work on centers through a heating coil and quench ring. The slide is guided on two stainless-steel shafts and fed by a cylinder on the upright. Oil reservoir and quench drain are in the base. A sheet-metal splash guard (not shown) surrounds the lower front of the base. The lower center is ball-bearing mounted, the upper motor-driven (to rotate work at will) and provided with a quick-operating, self-clamping adjustment lock, operated by pilot wheel *A*. The lower-center bracket is adjustable to suit work length. Infinitely variable feed control and a semi-automatic feed cycle are provided, so the operator merely loads the piece and engages a start lever. Skip-stop feed can be arranged to harden areas at intervals



IMMERSION QUENCHING . . Where preferred, progressively hardened parts can be immersion-quenched in oil or water (with recirculation to control temperature), directly after passing through the coil. Here a ⅞-in. lead screw, rotated at 75 rpm. (the usual speed), passes through a centralizing guide, the coil and into an oil bath surrounded by a water bath to control temperature (alternatively, oil may be pumped in at the tank bottom to cause heated oil to overflow at the top). The 0.40-carbon steel lead screw has the entire depth of thread hardened (depth controlled by feed rate) at 15 ipm. with a 20-kw. output electronic unit. Lead elongation is held within 0.0008 in. per ft. of screw length, with negligible distortion

ROUND TABLE

Excuses or Excellence?

"Gee, Al, this is worse than war times! I remember saying during the war that if we ever got back to normal peacetime production, this job would be a cinch."

"Things seem to be easing up a little, Ed. I think it will gradually straighten out."

"Not me. If people don't quit yelling quality, I'm going to tell them where they can go."

"But, Ed, you have to push for quality all the time. There can't be any let-down on quality just to get more production."

"You too! How do you expect me to keep up standards with the materials they give me, my equipment dying on its feet, men that are interested only in the pay check, and an increased schedule every week?"

"Well, Ed, that's your job. You are supposed to control your material, equipment and group so quality will result."

"You're getting just like the Old Man. You expect me to be a miracle man. I don't know what they're doing to the metal they send me, but it isn't uniform, and I can't buy new equipment. It's getting so you have to beg for a center punch."

"I know you can't make the materials or buy the new equipment—but you can control the processing and 'baby' the old machines along by stressing maintenance. And the attitude of your group—who do you blame that on?"

"I'm not blaming anyone, Al. I'm just pointing out that if they want me to meet specs they have to give me the tools to do it with."

"Ed, the only trouble with your argument is that if the material was uniform, you had the latest and best equipment and if your group were all A-1 operators who liked their job, you wouldn't have a job."

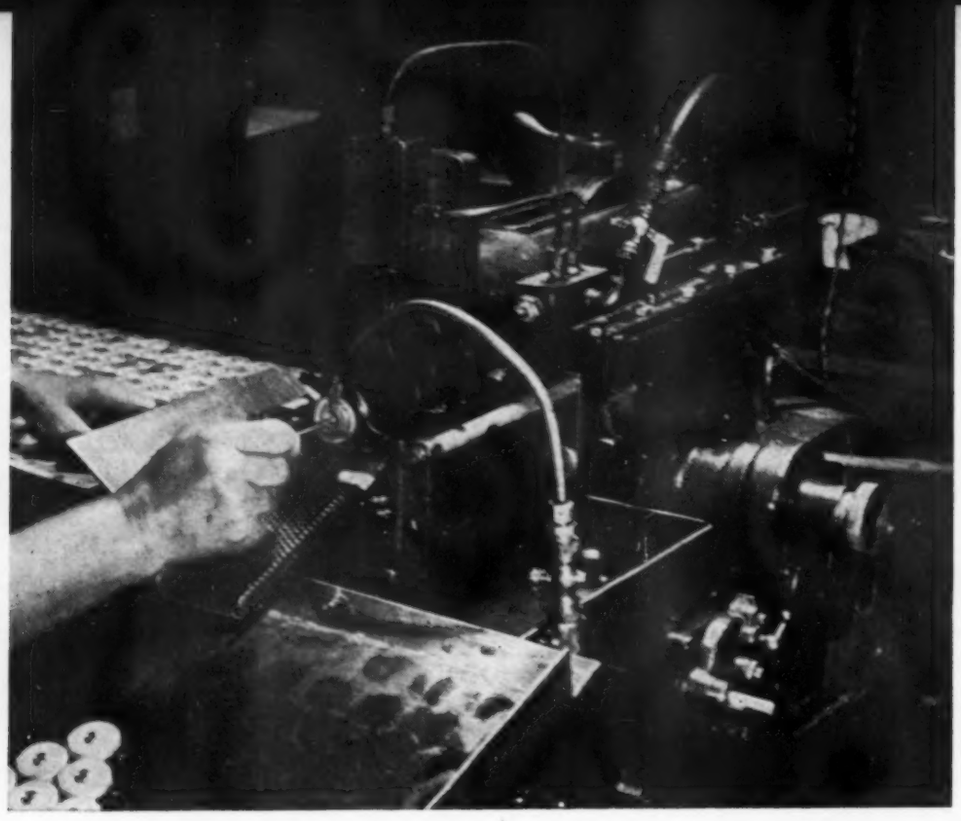
"Listen, Pal, when the day comes that my department will run itself I'll be dead and gone."

"Well, Ed, between that extreme and the picture you paint is probably the true situation. Maybe quality is harder to maintain when material is not the best, equipment worn, or employees lackadaisical, it may still be possible to get quality. But it is your job to work the material the best way, keep your equipment in best possible condition and have a smooth-functioning, cooperative group."

"Yeah, Al, I know all that. But it still doesn't give anybody the right to blame me for things beyond my control. The fixture that 'bounced' the other day was the best quality considering the material we had to work on."

"I don't think there is any such thing as good or bad quality—either it is right or wrong. If it meets specs, it's quality—if it doesn't, it isn't."

ARE POOR MATERIALS *and machines a legitimate excuse for poor work? Should a foreman blame them for bad production—or make out as best he can? Your opinions or suggestions will be of interest to others. Discussions of earlier topics appear on later pages.*



AIR CHUCKS of the toggle type, automatically controlled, grip the broach in a forward position and then use the normal return stroke to pull the tool through the work. Stroke is geared to enable operator to keep up with the cutting cycle and not waste strokes of the shaper head

BENCH SHAPERS ARE VERSATILE TOOLS

Broaching and knurling may be accomplished on bench shapers by fairly simple tool changes and air cylinder application

BENCH SHAPERS are handy tools to have around—even for operations other than shaping. Tool engineers of Telechron, Inc. at Ashland, Mass., have taken a number of 6-in. stroke bench shapers and, without radical changes, adapted them to broaching and knurling production operations. Intelligent application of air cylinders, chucks, cam-actuated movement and setting of the shaper stroke speed to practical loading speed has resulted in production increases up to 500% over previous methods.

Drilled holes in yellow brass watch components required a mirror finish before reaching the assemby line. The former method was to use a push broach and a foot press in finishing the holes. While the finish was satisfactory the rate of production left much to be desired.

Clockwork shafts are also being knurled on a shaper by setting a knurling tool into a holder in the shaper ram and designing tooling to feed, seat and eject the parts automatically. If the shafts are stepped on one end they must be loaded in the feed trough manually. Where the diameter is uniform throughout, the feeding may be automatic.

In the broaching setup, three spiral-tooth broaching cutters are used in each cycle, one being inserted through the component, one being pulled through the component on the return stroke of the ram and the third, on completion of the stroke, is dropped onto the tool cradle.

The cycle starts with the shaper ram in a forward position. An air valve, through an air cylinder, opens the automatic chuck to a predetermined dimension which is adjustable by a set screw. The operator then threads the part on the broach, places it against the faceplate where the chuck clamps the broach and starts the return or pulling stroke. This is ordinarily the rest stroke.

At the end of the stroke the broached component, which is held against the faceplate only by the tool pull, drops on a discharge chute directed to a small bin.

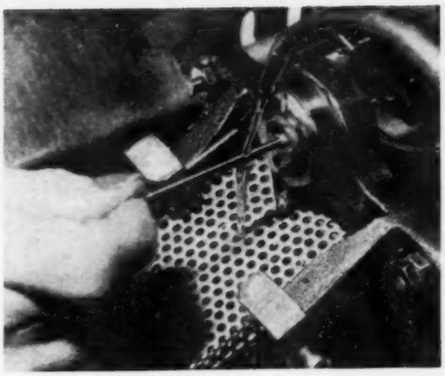
At the end of the cutting cycle, the main air valve is tripped by a cam which opens the chuck jaws through an air cylinder and automatically discharges the broach to a rack.

The shaper is set at the best possible working speed for all-round ease of the operation. The shaper stroke can be set much higher but the operator could not match the cycle in loading.

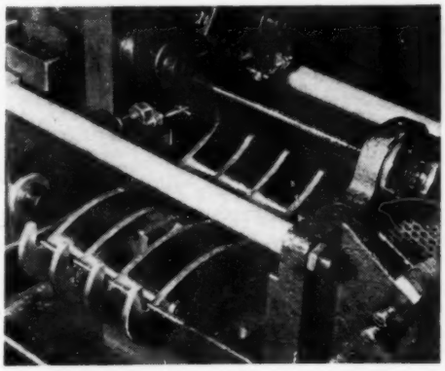
A knurling tool set in a toolblock in the shaper ramhead provides a means of rapid production of shafts for press fitting. The knurl seats the shaft more positively in assembly and enables production costs to be reduced by allowing more liberal tolerances on the shaft machining.

Loading troughs receive the shafts, either hand or hopper-fed, and a spring-tension finger moves them to the knurling station. Unloading is automatic, being accomplished by an ejection pin and gravity.

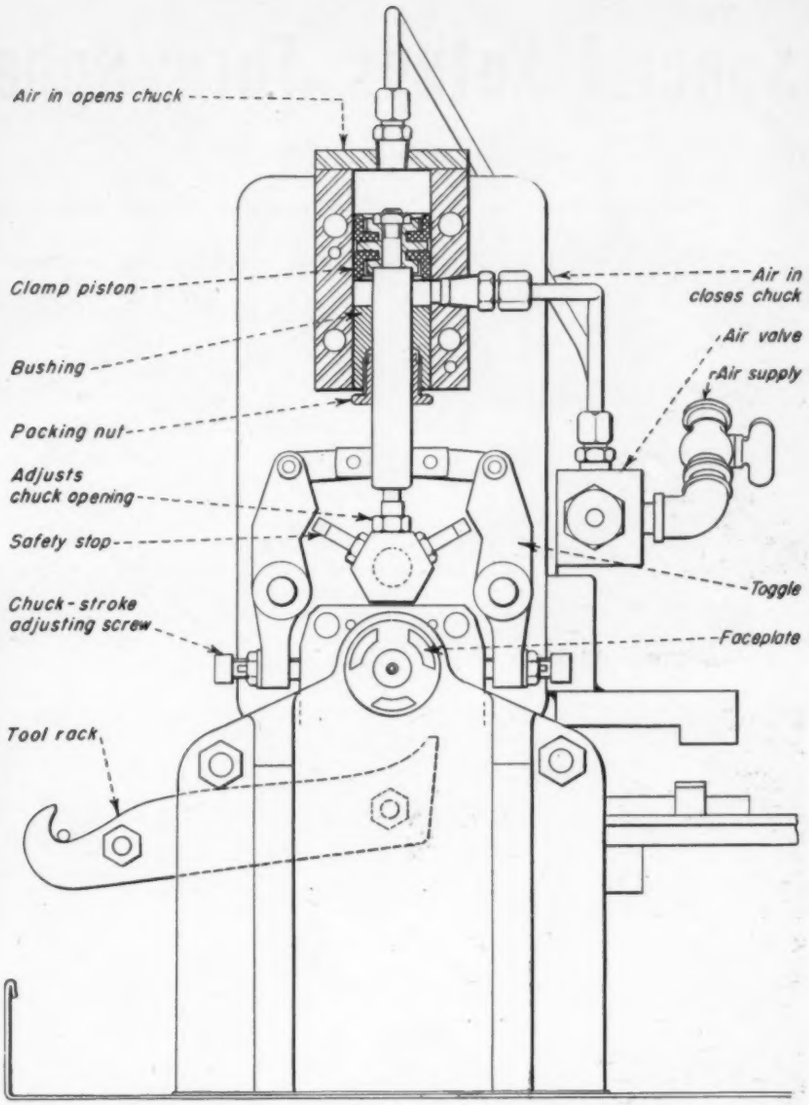
The air lines from the common plant line in the plant are regulated at about 5 psi pressure. A dial indicator is used with the air valve for setting air pressure which is brought through the main feed line by a flexible hose. The valve is a 4-way type with adjustable cam stop to open and close it. With the main air valve open the air pressure comes in and



TRANSPARENT cutting oil lubricates tool and work and provides easy inspection, in addition to washing chips off the tool for the following cycles. Faceplates may be changed to position varying diameters of parts



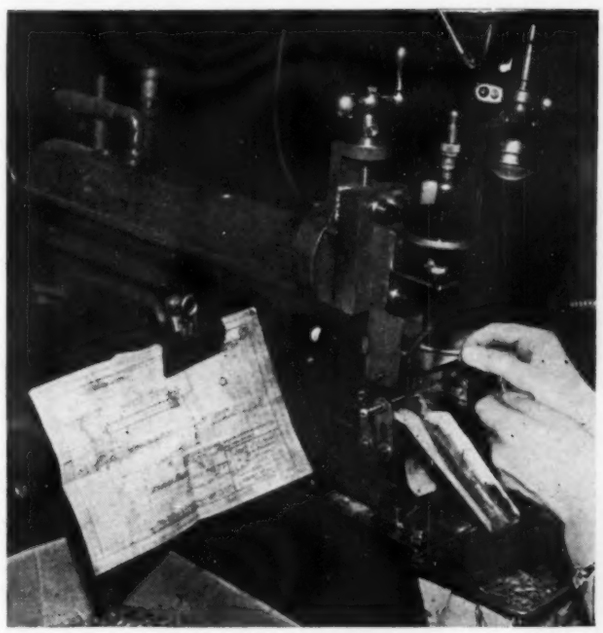
INCLINED TOOL RACK receives the broaching cutter at the end of the cutting stroke as it is released by the chuck and it is ready for threading through the next component. Here, the component has dropped off the faceplate at the end of the stroke and the chuck jaws are just about to release the tool



TOGGLE ACTION, actuated by an air-driven piston and controlled by adjustable stops, opens and closes the chuck in advance and return positions. Detail of air cylinder construction discloses simple design of setup

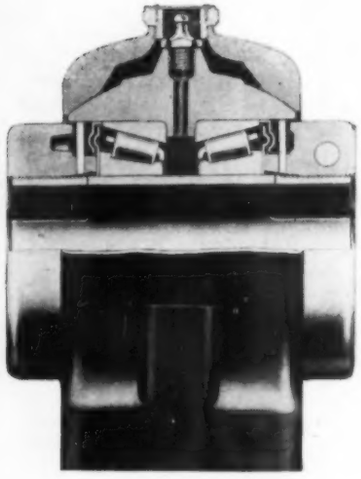
passes through the chuck valve, actuating a toggle mechanism to control chuck jaw action. Adjustable screws control the width of opening of the serrated jaw faces to handle a range of broach diameters. The faceplate is merely used to position the component and provide a resistance to the pull of the ram.

Refinements are constantly being made in these shaper adaptations, particularly concerned with making the feed more automatic and allowing greater production and shorter cycles. The inherent versatility of the shaper will be put to wider use in the operations on small parts where the rapid reciprocating motion will meet driving and actuating requirements. Air pressure has provided a ready means of supplementary machine action on these machines and will no doubt be applied in the majority of cases.



KNURLING CUTTER, mounted in a block in the head of the shaper ram, provides a rapid means of knurling small steel shafts. Automatic stops and feeding troughs fed by hand keep work in constant flow to the knurling station

Special Setups Turn Spherical Surfaces



MATING SPHERICAL SURFACES on the liner and in the pillow block of this self-aligining Dodge-Timken bearing assembly are turned and bored within precision limits to assure freedom of alignment with the shaft while the shaft is supported without play between the contacting surfaces

Precision boring and turning of ball and socket sections for self-aligning bearings and pillow blocks is done on a production basis with tricky tooling

BY C. A. BLOOM

CHIEF TOOL ENGINEER, DODGE MANUFACTURING CORPORATION

PRECISION turning and boring must be done on a mass-production basis for Dodge self-aligning bearings. Pillow blocks and their liners are made in a number of styles and sizes, and mating spherical surfaces to be machined range from about 3 to more than 30 in. in diameter. In smaller sizes, spherical diameters usually are held to tolerance of 0.002 to 0.003 in., while 0.003 to 0.005 in. usually is allowed on larger pillow blocks.

Turned, Not Ground

A number of years ago, mating spherical surfaces were finished by grinding, but they can be finished faster and more accurately with carbide-tipped tools if machines and accessory equipment are properly designed and maintained.

Radius-nosed turning and bor-

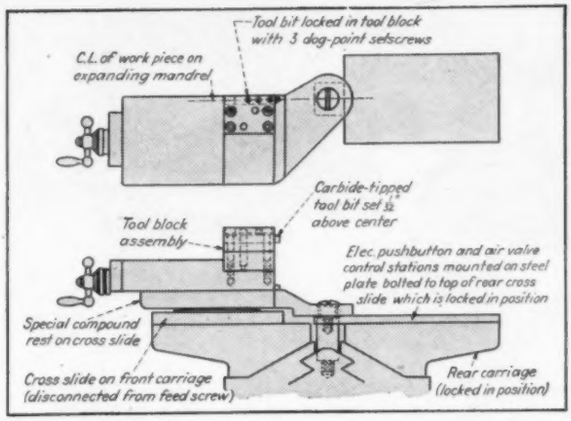
CAST-IRON INNER LINERS, 4 to 8 in. dia., for special-duty pillow blocks are turned on this setup on a No. 3 LeBlond. Accurate movement of the toolbit is obtained by longitudinal movement of the front carriage. The front cross-slide is free to move transversely while its compound rest rotates about a fixed vertical axis in the center of the lathe bed. Accurate positioning of the toolbit is possible by adjustments of the compound slide

END SPHERICAL SURFACES (12- to 30-in. dia.) of liners for large bearings are set up in this converted Avey pulley lathe. A standard 16-in. rotary table on the bed has a 3-in.-thick steel plate bolted on top to support the cast-steel tool block. An arcuate track supports the overhang of this steel plate. The rotary-table worm is driven by V-belt through a 7-in. sheave from two 48-to-1 geared-head motors. The rotor of one motor has been replaced by a 4-in. sheave, and the frame has been cut away to clear the V-belt which connects this sheave to the drive sheave of the second motor. The carbide-tipped bit with 1/16-in. nose radius can be replaced with a tool-post grinder for extreme finishes

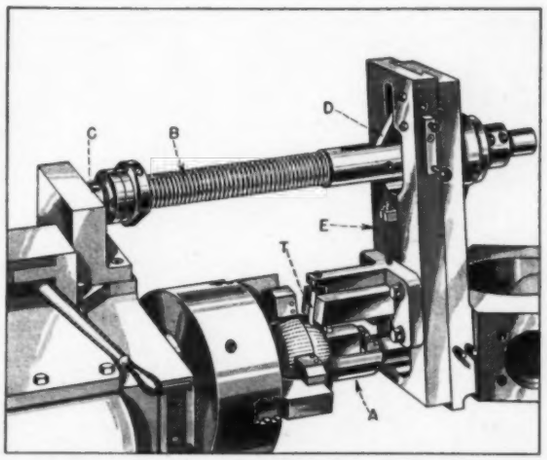
ing tools are used in all of these setups—usually the same one for roughing and finishing The roughing cut normally is taken at a feed of about 0.010 in. per rev. Finishing cuts usually are made with feed direction reversed and at about 0.004 in. per rev. In some setups for spherical-boring larger pillow blocks, separate tools are used for roughing and finishing. In these cases, two or three tool bits are mounted in the same block and spaced so the roughing bit completes its work before the finishing bit starts to cut.

In most cases, spherical turning and boring are the final machining operations to insure accurate location with regard to other surfaces. However, in liners for sleeve bearings, spherical surfaces usually are finish-turned before the babbitted bearing is finish-bored.

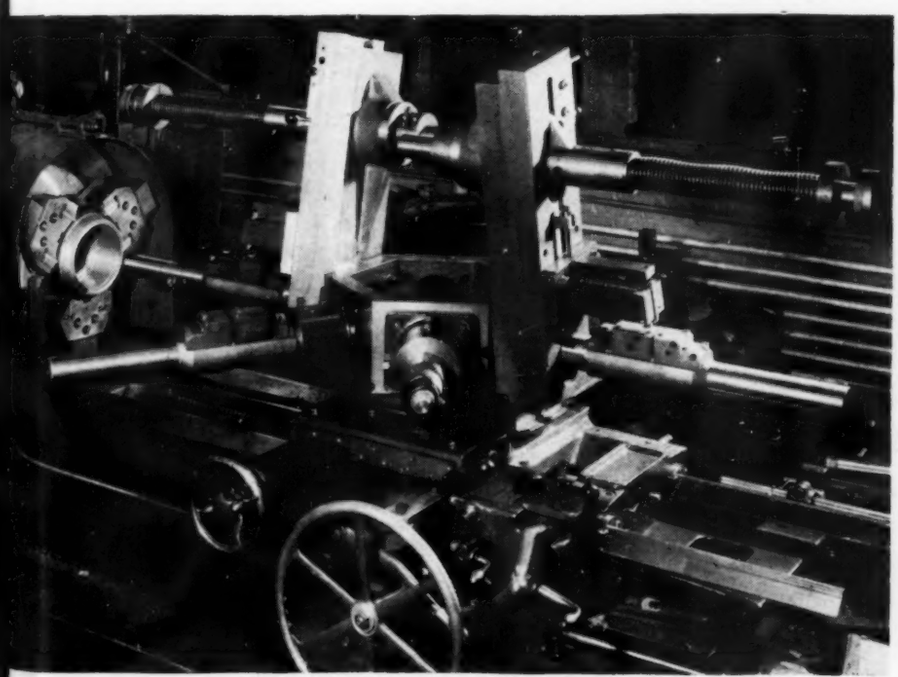
Other methods have been tried with varying success, but those shown here are considered most satisfactory in accuracy of performance, economy of design and operation, and freedom from maintenance difficulties.


Tool bit locked in tool block with 3 dog-point setscrews
C.L. of work piece on expanding mandrel
Carbide-tipped tool bit set ½ above center
Tool block assembly
Elec. pushbutton and air valve control stations mounted on steel plate bolted to top of rear cross slide which is locked in position
Special compound rest on cross slide
Cross slide on front carriage (disconnected from feed screw)
Rear carriage (locked in position)

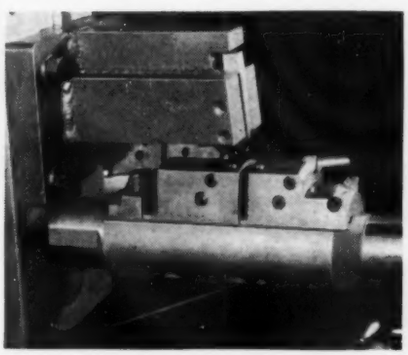
TOOLING SETUP . . Originally, the rear carriage also was equipped with a similar compound cross-slide, but a second tool was not needed. Therefore, the rear carriage has been locked in position and supports a steel plate on which are electrical pushbutton stations and the air-control valve for the expanding mandrel on which the work is held. For most spherical turning, the tool bit is 1/32 in. above center

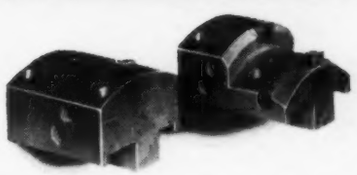


SPHERICAL-turning tool slide is used while boring bar *A* is being fed into the workpiece. Forward movement of the turret brings spring-loaded bar *B* against an adjustable stop *C* bolted to the headstock. Continued movement of the turret causes bar *B* to move back through the vertical slide assembly, forcing connecting link *D* to push slide *E* upward. This slide carries tool block holding carbide-tipped bit *T*. This bit follows an arcuate path. Separate tools are used for roughing and finishing



LINERS with 8- to 15-in. dia. spherical surfaces are rough- and finish-bored, and spherically turned on each end in two setups on this Warner & Swasey No. 4-A turret lathe. Carbide tools are used. Five of the six turret stations are used in this sequence: (1) Rough-bore and rough-spherical-turn one end, (2) Finish-bore bearing seat, and chamfer and finish-face one end, (3) Blank station, (4) Semi-finish bore, and finish spherical turn one end, (5) Finish bore, and (6) Pull casting onto adapter for removal from special air-operated chuck. For operations on the other end of the same casting, the chuck is replaced with one designed to hold the part on previously finished surfaces



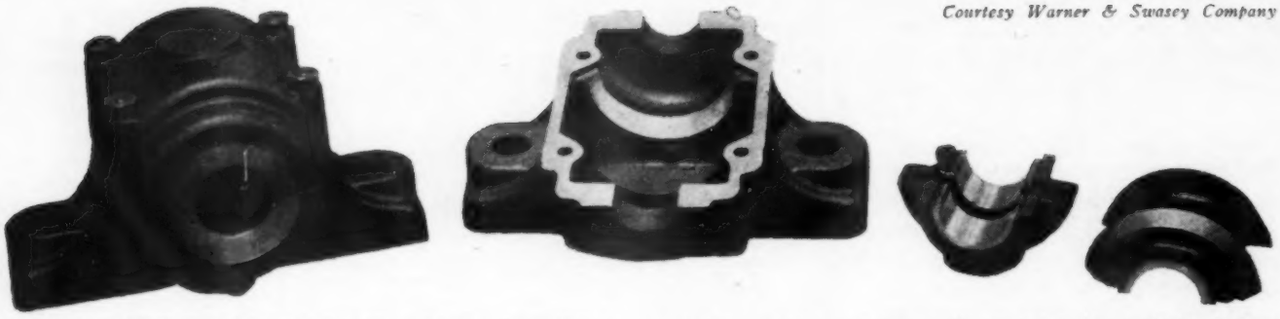


REPLACEABLE TOOL BLOCKS on the boring bars permit the bits to be positioned accurately before mounting on the bar. This eliminates considerable setup time when changing from one size of liner to another. The spherical turning bit in the vertical slide is positioned with a backup screw

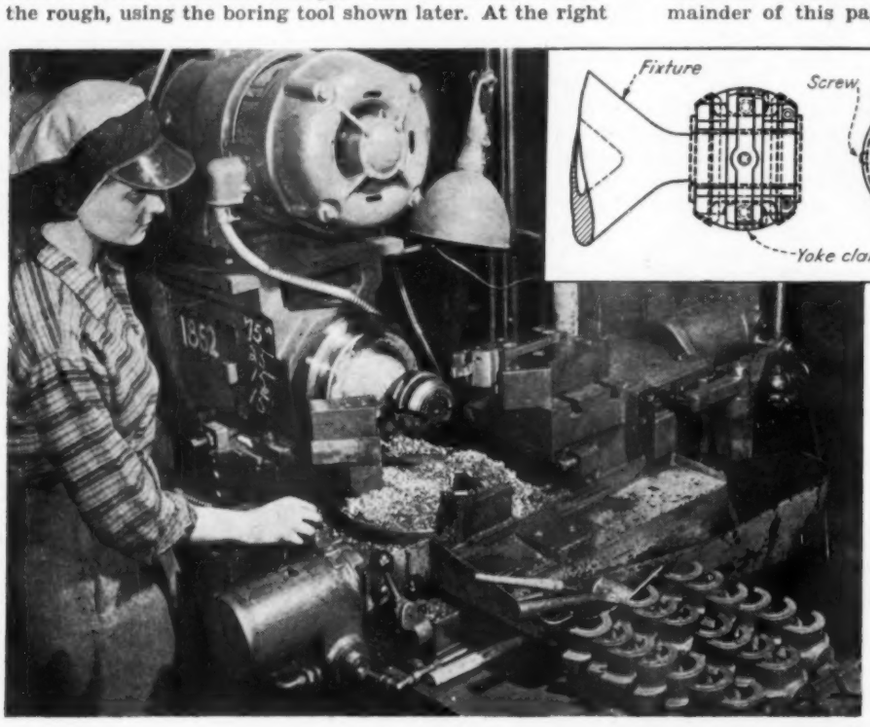
Photographs on liner setup courtesy Warner & Swasey Company

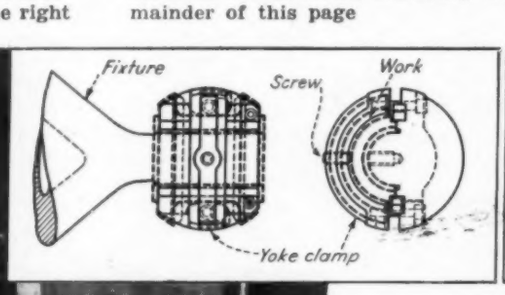
(continued on next page)

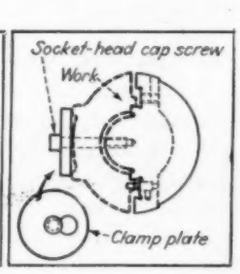
Courtesy Warner & Swasey Company



PLAIN-BEARING SLEEV-OIL pillow blocks sometimes are made with two spherical seats in the base and mating surfaces on the lower liner. An assembled block is at left. Next is a base with the two spherical seats finished from the rough, using the boring tool shown later. At the right are the upper and lower liners with the babbitt lining finish-bored and faced and spherical surfaces on the lower liner finish-turned. Setup for finish-turning these surfaces is shown in following illustrations on the remainder of this page





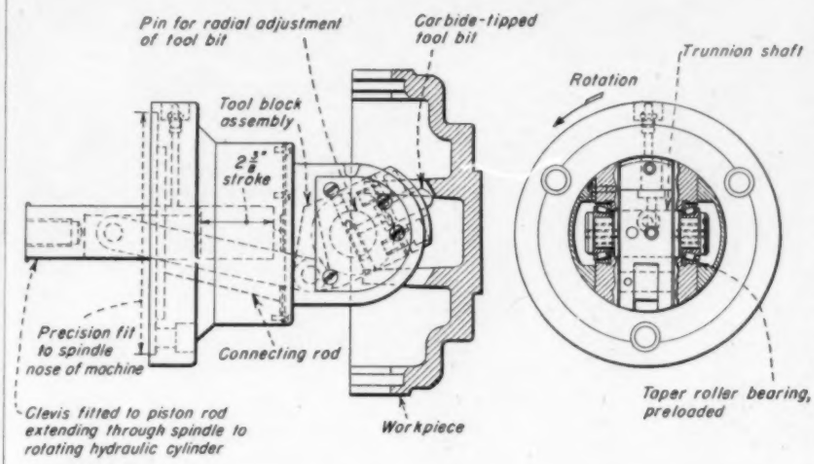


SPHERICAL SURFACES 3 to 11 in. in dia. at each end of the lower liner are turned in this converted precision boring machine equipped with a special Heald spherical turning and facing fixture originally developed for a double-spindle machine. A 4-speed Lima 5-hp. gearshift motor drives the spindle at 200 rpm. through V-belts. This speed makes necessary the cast-steel clamp yoke and socket-head screws necessary on this spindle fixture for smaller sizes. Hardened-steel setting rails reduce fixture wear. To face upper liners, rails are removed, clamp changed and only rear slide used

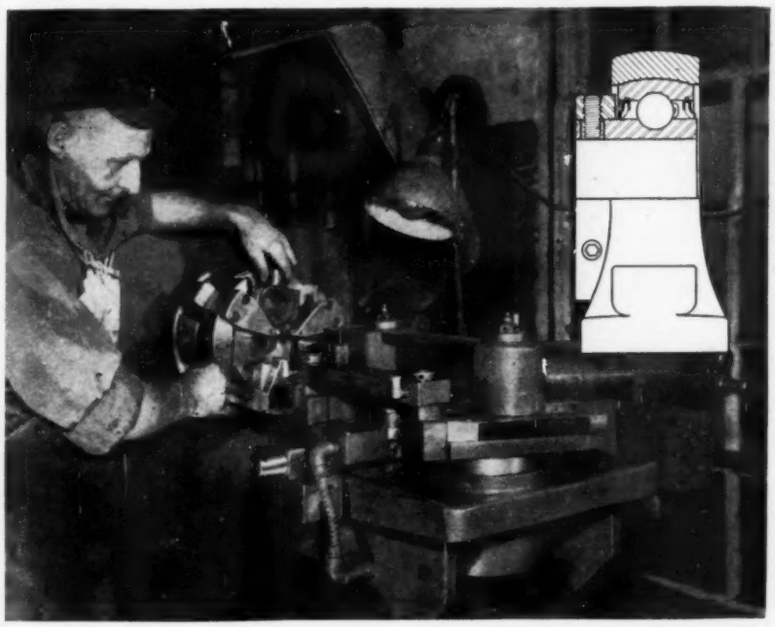
SETUPS FOR SPHERICAL TURNING

continued

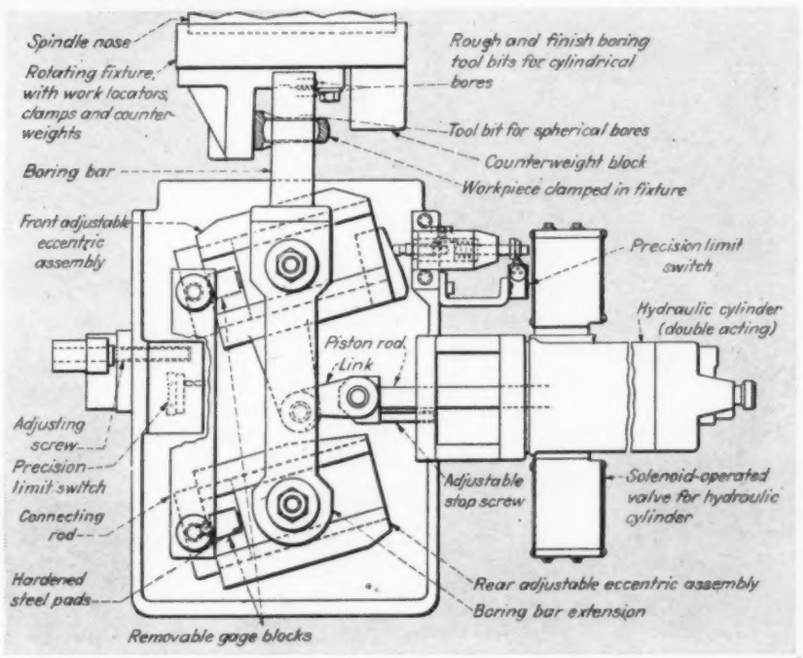
FIXTURES for larger bearing sizes require an outboard support. Both ends of the bearing liner are faced with the rear tool slide while the spherical surfaces are turned with the front tool supported on a rotary table. Both tool slides are arranged for roughing and turning passes without tool adjustment, finishing being done as the tools are returned to the starting position after completing the roughing paths. Spherical surfaces must be held within 0.001 in. on these parts


Pin for radial adjustment of tool bit
Carbide-tipped tool bit
Trunnion shaft
Rotation
Tool block assembly
2⅜" stroke
Precision fit to spindle nose of machine
Connecting rod
Clevis fitted to piston rod extending through spindle to rotating hydraulic cylinder
Workpiece
Taper roller bearing, preloaded

TWO SPHERICAL SEATS in the pillow-block base are rough- and finish-bored with this special tool head for a No. 46-B Heald Bore-Matic. This machine has two speeds, 45 rpm. for larger castings and 70 rpm. for smaller castings. A 2⅜-in. stroke of the rotating hydraulic cylinder at the rear of the spindle causes the tool block to rotate. The link connecting the piston-rod extension with the tool block is lapped to fit its bearing pins to eliminate backlash. Interchangeable tool blocks are used for the different casting sizes. Precision adjustment of the carbide bit is provided by wedge-end pins. The tool block assembly rotates on a cross shaft mounted in taper roller bearings lubricated with vaseline

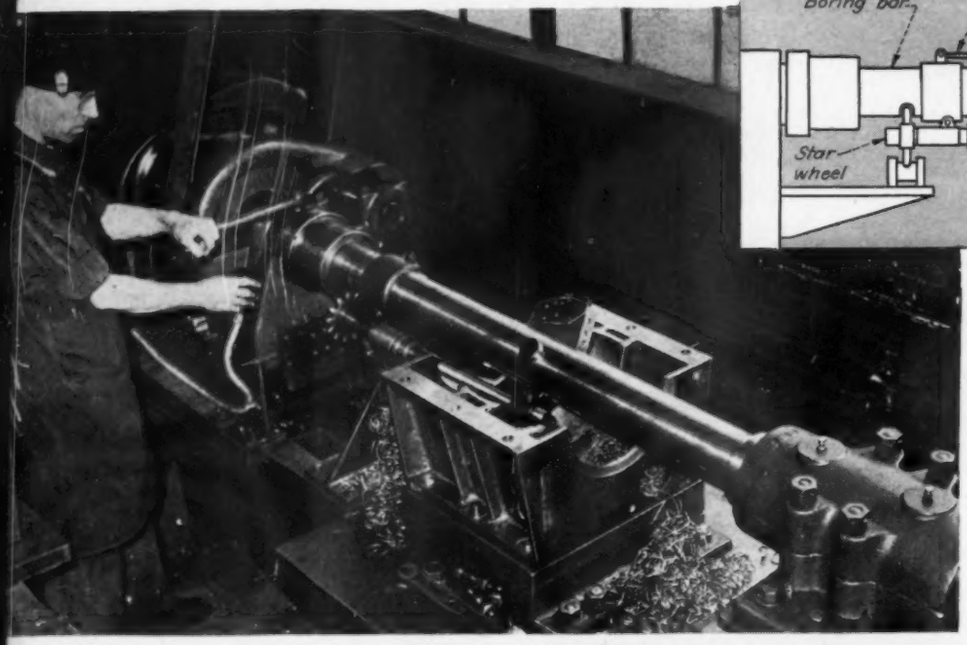


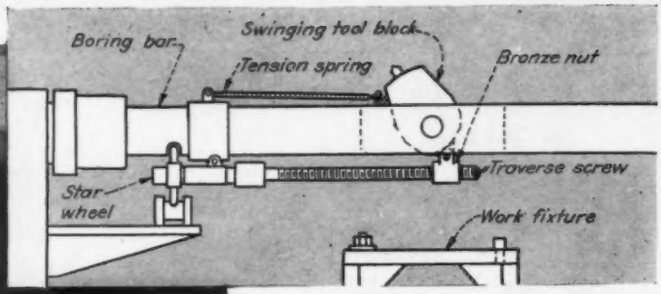
MORE THAN 30 TYPES and sizes of Dodge SC self-aligning ball-bearing pillow blocks are cylindrically and spherically bored (to 0.0004 to 0.0006 in., depending on size) with this specially tooled 47-A Heald Bore-Matic. Interchangeable work locators and clamps hold the castings on the rotating fixture, which can be turned at 370, 450, 520, or 750 rpm. When boring spherical seats, a roughing cut is taken at 0.010 in. per rev. feed, then the boring bar is returned at 0.0004 in. per rev. feed for finishing. The boring bar has a roughing and a finishing bit for the cylindrical bore and a single bit for spherical boring. Cylindrical bores are roughed and finished by traversing the table with the boring bar fixed. Then a positive stop automatically actuates the hydraulic cylinder which causes the boring bar to follow an accuate path while rough-boring the spherical surface. At the end of this cut, the boring bar automaticlly reverses at a slower speed to finish-bore the same surface



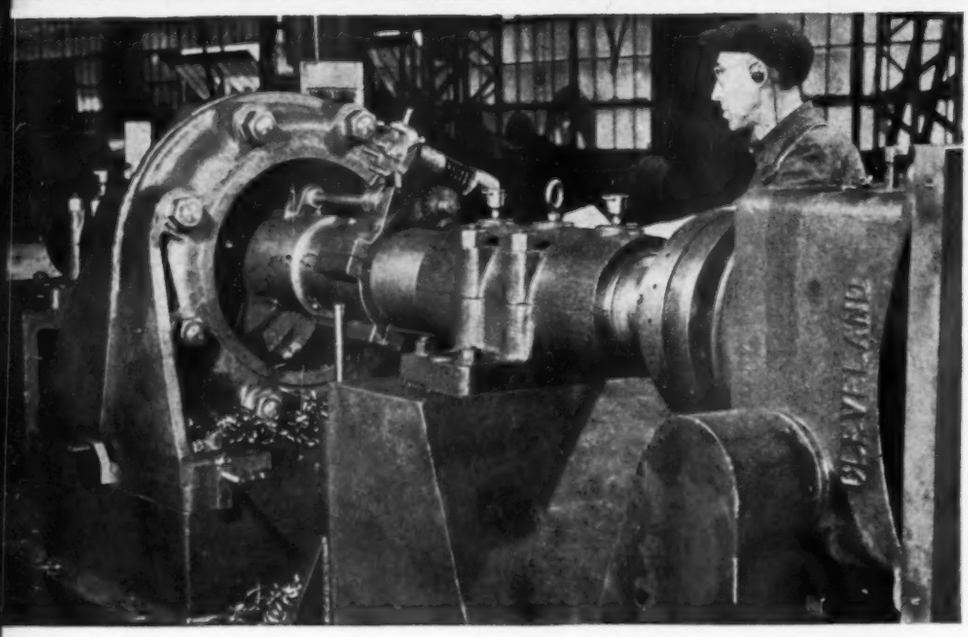
THE HEAVY BORING-BAR EXTENSION is mounted on two bearing pins fitted vertically in eccentric assemblies connected by linkage to a hydraulic cylinder which, when actuated, causes the boring bar to travel through an arc. Eccentric bearing blocks are positioned for different radii by interchangeable gage blocks fitted between hardened steel pads in the eccentric assemblies. Radius of movement of the spherical boring bit can be varied from 0.003 in. to about 6 in. Precision limit switches control the automatic cycle of spherical boring. To simplify setups, the rotating fixture is arranged so the center of the spherical bore in each part is located 4⅞ in. from the face of the spindle nose. Resetting of table stops therefore is not necessary when changing from one bearing size to another.

Courtesy The Heald Machine Company

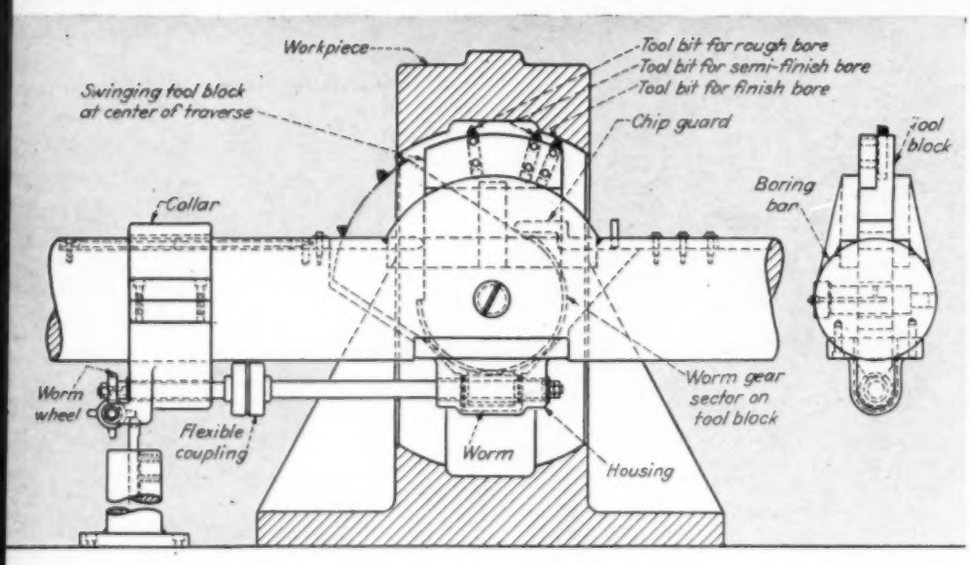




AN OLD 24-IN. BELT-DRIVEN shaft lathe was war-converted for spherical boring in welded-steel pillow blocks for marine bearings. The upper pillow-block half has been removed to show the swinging tool block moved by rotation of a leadscrew inside a bronze nut on the short end of the block. The block itself is mounted in a 1½-in.-wide slot milled through the center of the 5-in. dia. bar. The feedscrew is turned by a star wheel which contacts a stop-pin once each revolution of the bar. A heavy tension spring takes up backlash between feedscrew and nut. The boring bar has a short longitudinal adjustment for centering the tool block with the workpiece assembly. Headstock of the lathe was raised 10 in. on a welded steel block to provide room for the work-locating fixture. Because of wear in the bronze nut, this design of a spherical boring bar has not proved too satisfactory



TWO WORM-WHEEL DRIVES rotate the tool block in this special machine for spherical-boring large (23- to 30-in. dia.), heavy-duty pillow blocks. Drive to the 8-in. dia. bar is through a right-angle gear reducer from a 10-hp. motor at the right-hand end. At the center of the bar where the 3-in.-thick tool block is fitted into a milled slot, bar diameter is increased to 10 in. and further support is provided the tool block by welding heavy steel plates on either side of the slot



THE SWINGING TOOL BLOCK for this special machine carries three carbide-tipped tool bits, the routhing bit being set ahead of the other two so it clears the work before the semi-finishing and the finishing bits start to cut. Sliding chip guards maintain contact with both sides of the tool block so chips cannot get into the worm drive which rotates the block within the bar. A star wheel causes rotation of the drive worm. Fixture plates are interchangeable so different sizes of tool-block assemblies can be centered accurately with the boring bar and the swing tool block

Visual Layout PREVIEWS PRODUCTION

BY HARRY S. WHAREN
ASSOCIATE EDITOR

MERRY-GO-ROUND conveyor for front-end subassembly is located on the first floor parallel to the final-assembly line. Each conveyor platform, chain operated, carries a fixture on which the grille, headlights and front fenders are assembled

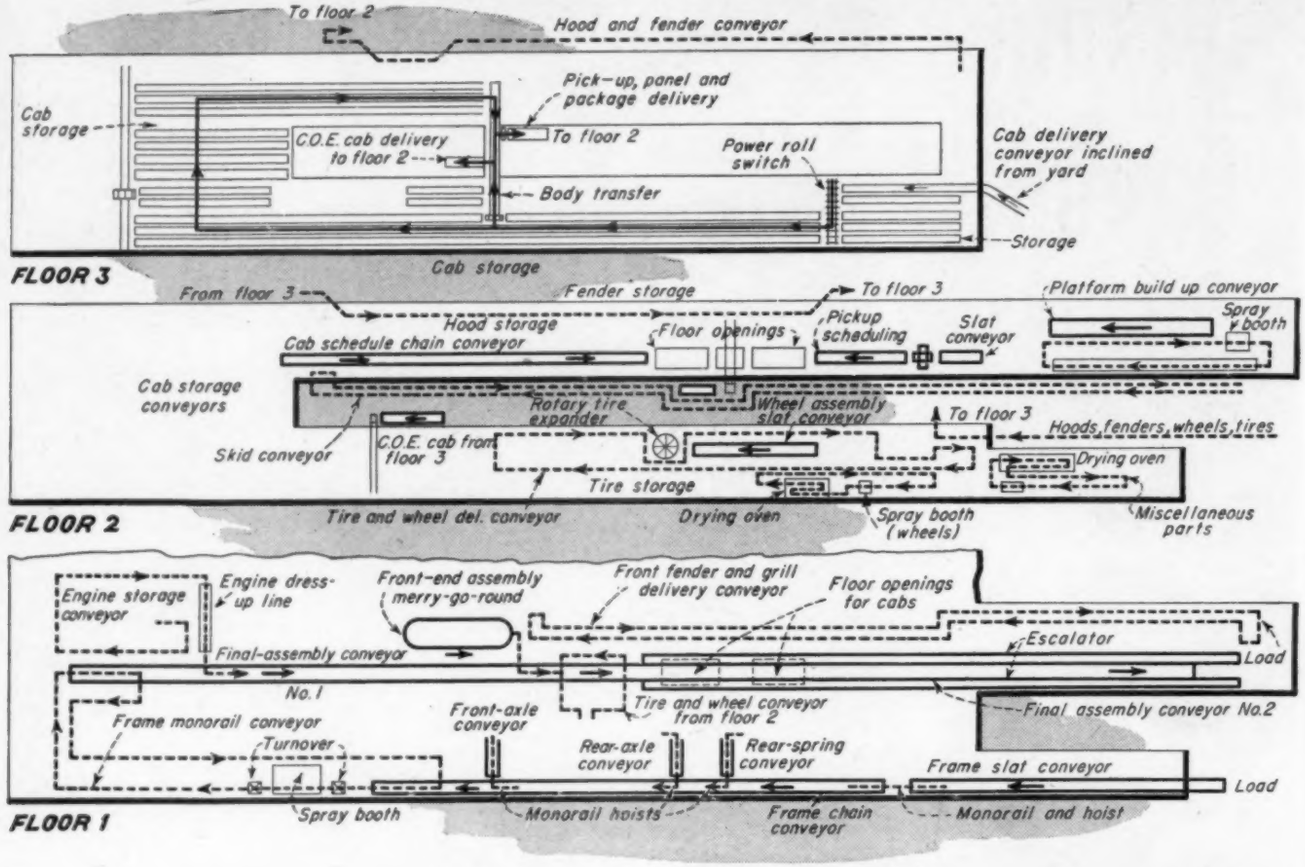
VISUAL PLANT LAYOUT of the truck-assembly line at Highland Park previewed its operating efficiency, helped determine space, worker and equipment utilization and permitted an accurate analysis of the operations. William F. Pioch (with pencil), director of production engineering department, and Art Willis, head of plant layout section, here study the first-floor model

SQUEEZED between the production department on one side and cost accounting and budget on the other is the plant-layout engineer. Demands for most efficient layout, but within budget allocation, create problems not easily solved by handbook or slide rule. Required are ingenuity, vision and application of modern layout tools. Not least of these tools are three-dimensional models and visual plant layouts.

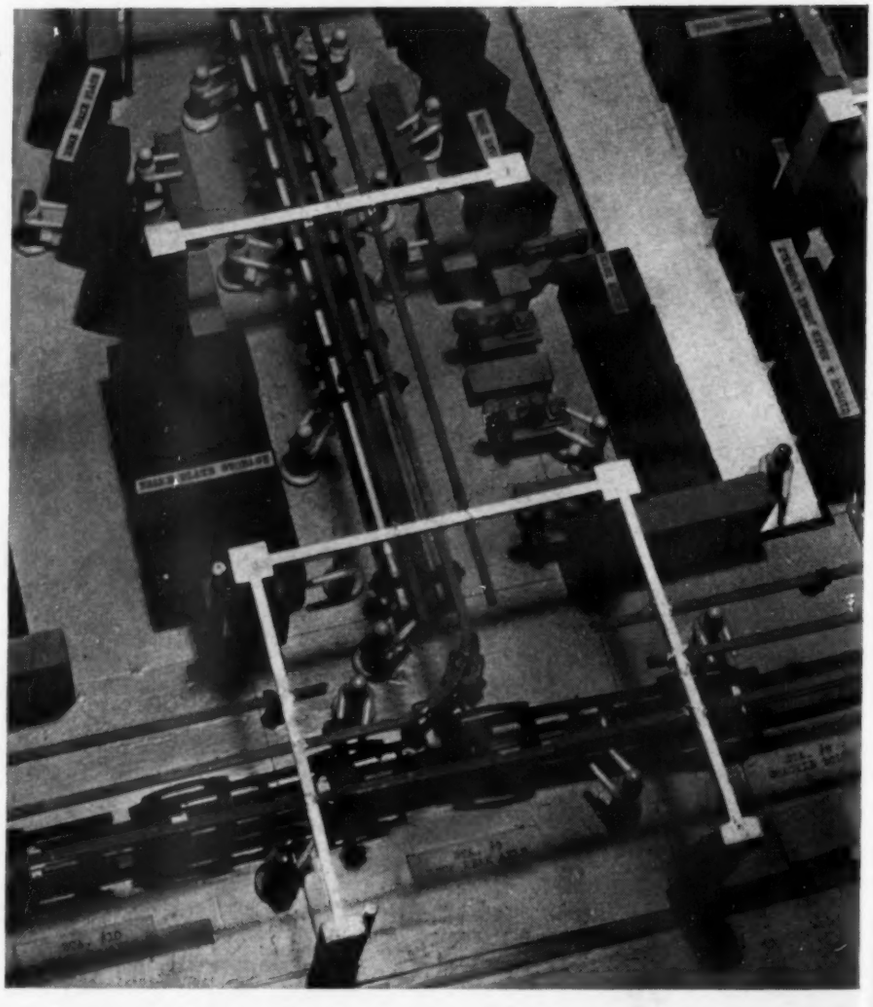
When Ford undertook modernization of its Highland Park plant, visual layout played its part. Built for manufacture of the Model T with its short wheel base, the plant now was to serve for trucks and busses with their much greater lengths. This meant not only spending over $2 million on the modernization. It meant arranging delivery, subassembly and assembly lines so as to avoid interference with existing building structure and effect a smooth flow of materials from receiving through the plant and finally out the door—but now on wheels and under their own power.

Visual layout, combined with standard plant layouts, previewed the plant's operating efficiency by representing the actual equipment and structures needed for production. It helped in determining space utilization and estimating possible pro-

• FORD, PIONEER IN MECHANIZED HANDLING, APPLIES VISUAL PLANT



TRUCK ASSEMBLY and storage occupies three floors. Floor-type conveyors are designated by solid lines, and overhead delivery and storage conveyors by dotted lines. Floor 3 is cab storage with conveyor delivery to scheduling conveyors on floor 2, where wheels also are painted and assembled. Final assembly is on floor 1 with a 410-ft. frame line and a 1000-ft. final line, fed by numerous subassembly and delivery conveyors. Escalators, which are simply belt conveyors over slat conveyors, are located on each side of final line No. 2 to carry workers as final assembly is made. To avoid any delay, each final-line conveyor has a dual drive in case of accident or breakdown. Moreover, all main conveyor drives have shearpin sprockets, so if any conveyor is jammed, the sprocket pin shears off before further damage can be done



FRAME-ASSEMBLY LINE is stationized (30 stations) so each operation is allowed sufficient time, as determined by time studies from 13 Ford branch assembly plants. At stations 8, 9 and 10, as shown in the model layout, shackle bolts, master cylinders and rear axles are assembled. Rear-axle conveyor, 45 ft. long, is serviced by overhead monorail hoist extending over frame conveyor. Storage areas are modeled with miniature stock piles

ductivity of men and machines, and enabled manufacturing engineers to study the over-all sequence of operations involved in the assembly. It aided visualization of the program and permitted an accurate analysis of the entire operation, so handling methods could be developed and selected to meet the distribution problem and yet conform to physical requirements and desired production.

In building up a visual layout, every item — machine, conveyor, paint spray booth, oven, drinking fountain, fence, elevator gate, storage bin—is modeled from wood to a scale of ¼ in. per ft. and installed in its correct location. Workers are represented by plastic figures, scaled for average-sized men. Supervisory employees are identified by white heads with yellow dots, and inspectors by red dots. Molded plastic models can be turned out rapidly and are less expensive than wood models.

Colors Identify Models

All models of production, handling and storage equipment, as well as of products—trucks, busses, automobiles —are carved from wood painted distinctive colors that identify as to type of equipment. Models of all moving parts of machines and equipment, such as conveyors and moving assembly lines, are painted yellow. Stationary items, including workbenches, spray booths, ovens, furnaces and tanks, are painted green, while storage bins and stock piles are painted silver.

Models are carved with considerable detail worked into each model. For instance, receiving and stock storage areas are modeled complete with miniature stock piles. This care demands that skilled craftsmen make each model, especially if close clearances are to exist in the production layout. Use of such skilled workers makes these models fairly expensive.

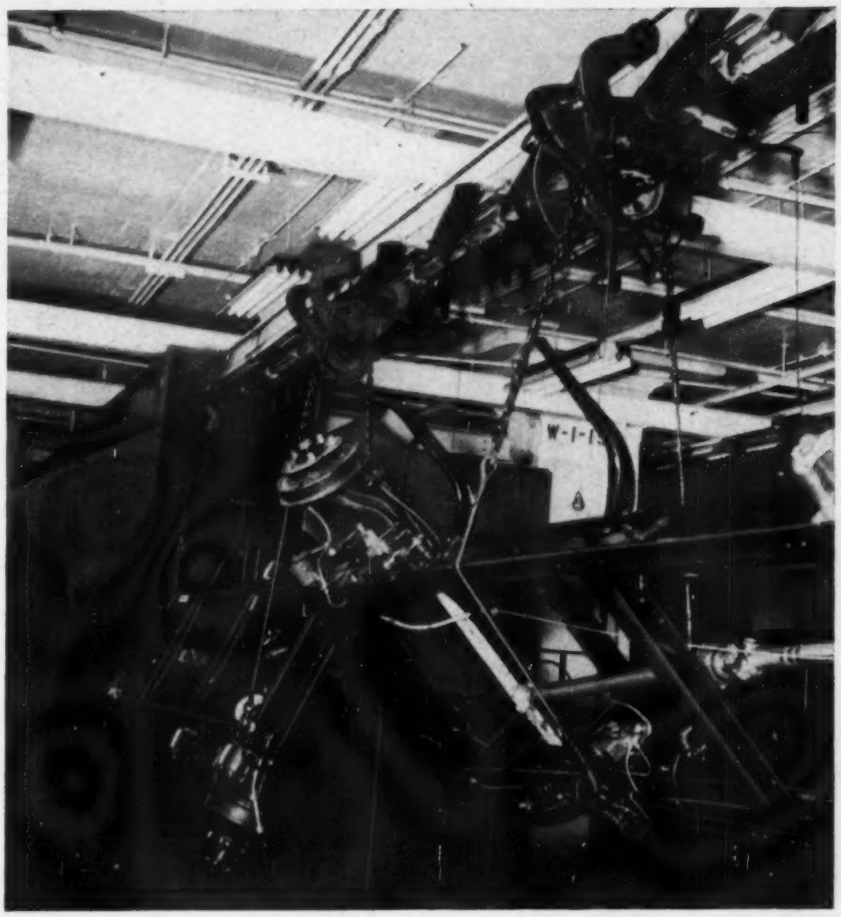
For that reason and as most models are not available commercially, many companies have neglected to use this valuable layout tool, despite its obvious advantages. To gain wider acceptance of this modern layout method, a committee of the American Society of Mechanical Engineers is now preparing standards for plant layout templets and scale models. Model standards will cover features of scale, detail, finishes, allowances, clearances, materials, construction and identification.

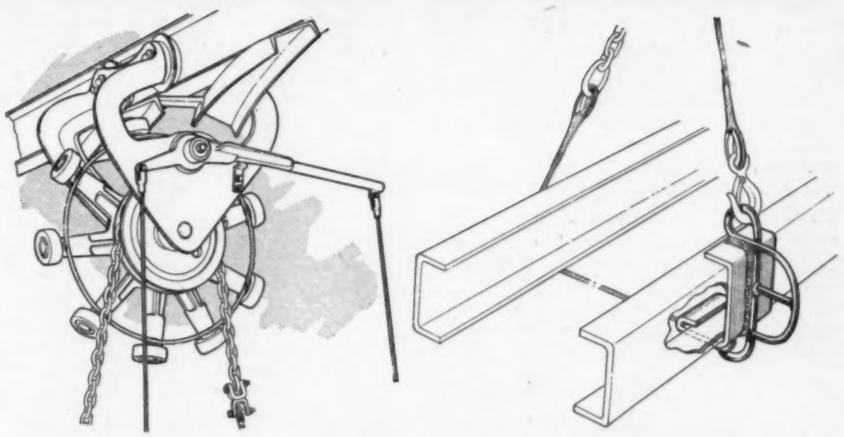
It is generally agreed that models should be easily distinguishable as representative of the actual equipment, although highly successful plant layouts have been made simply by using blocks of wood, either with or without identification colors.

Visualization, however, is greatly increased and study of manufacturing processes is made more easily and quickly if models look like the full-sized equipment and have marked on them all the clearances and other data needed for planning.

The completed plant arrangement for truck assembly covers three floors. From unloading docks outside the building, parts and subassemblies are delivered by conveyor, whenever possible, to any floor as desired.

Cabs, delivered to the plant by truck, are unloaded by a hoist operating on a monorail track and placed





ASSEMBLED FRAMES are turned approximately 90° by an automatic turnover. Ball bearing rollers at the end of radial arms on the turnover unit engage a series of cam-like tracks which slowly revolve the radial-arm unit, chain sprocket wheel and also the frame until it flops over in its cable sling. Sling details in the sketch show how the cable is looped around the chassis

on an inclined 42-in. slat conveyor for delivery to the third floor. A limit switch controls cab movement at the upper end of the conveyor, from which they are transferred by a power roll switch and crosswise chain conveyor to four inspection slat-conveyor lines and then to cab-storage lines.

Scheduling Conveyors

From third-floor storage, two inclined slat conveyors deliver cabs to second-floor storage from which they are fed to two scheduling conveyors on the same floor. One slat conveyor handles C.O.E. (cab over engine) cabs, and the other pickup, panel and package delivery cabs.

When a cab is placed on a scheduling conveyor, the skid on which it has been mounted up to scheduling is removed and returned to the unloading dock by a 4-in. Ford-designed monorail conveyor.

The two scheduling conveyors (270 ft. and 106 ft. long) are loaded according to schedules transmitted by TelAutograph writers connected to eleven receiving stations, located throughout the plant at strategic points that control proper integration of cabs, chassis and other parts. From scheduling conveyors, cabs are lowered through floor cut-outs to the first-floor final-assembly line. Because of low headroom, panel delivery bodies are transferred by a manually controlled body transfer to a floor elevator that lowers 2½ ft., so body hooks can be attached and bodies picked up by hoist and lowered through the cut-out. The elevator is operated by four individual motors driving four Acme screws and controlled from a nearby panel.

Hoods, tires, rims, wheels and rear fenders are delivered from unloading docks by a 6-in., 3,500-ft. long monorail conveyor, pushbutton-controlled from a central switchboard and with nine stop stations with signal lights to show at which station the conveyor may be stopped. Because of its length, it is driven at five points.

Wheels and tires are removed on the second floor and transferred to the wheel and tire monorail delivery conveyor, from which wheels are in turn transferred to another monorail conveyor for painting and drying and then back to the delivery conveyor. The drying oven is gas fired, as Ford has found that gas firing is cheaper than infra-red drying and provides better control.

Hoods are removed for storage on both second and third floors, with third-floor storage acting as a safety bank to the main storage on the second floor. Fenders are also removed on the second floor near the scheduling conveyor where fendering is done.

On the first floor, truck frames are unloaded from railroad cars by crane and placed on a 42-in. slat conveyor from which they are transferred by a monorail hoist to the frame-assembly chain conveyor. The latter conveyor, 410 ft. long and traveling at 14 ft. per min., can handle 250 frames in 8 hr. At various stations along the line, rear springs, rear axles and front axles are fed from subassembly conveyors as short as 30 ft. Shackle and spring hangers, emergency brake brackets and frame reinforcements are squeeze riveted to eliminate riveting noise.

At the end of the frame-assembly conveyor, frames are picked up at both ends by monorail hoists and moved along by an auxiliary live conveyor with manual pickoff. This arrangement permits the dead conveyor to act as a storage conveyor as needed, takes up production lag as frames can be disconnected and pushed more rapidly by hand if necessary, and accommodates frames of different lengths.

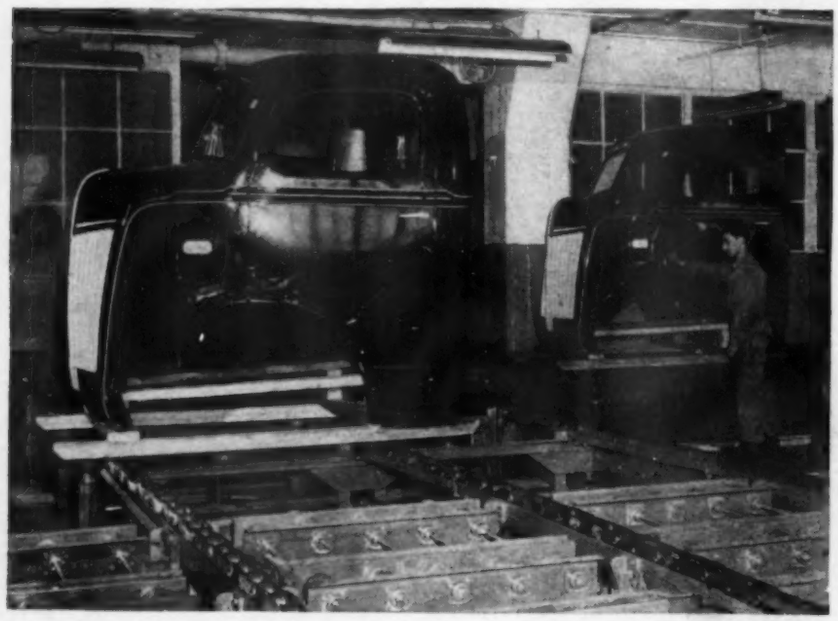
Turnover Automatic

Frames, until now upside down, are turned 90°, passed through a paint spray bath where both sides are sprayed and again turned 90° to bring them right side up. Turnover is accomplished entirely automatically by overhead arms in the form of wheel spokes attached to the frame sling and passing through a series of cam-like tracks, each of which turns the frame about 10°.

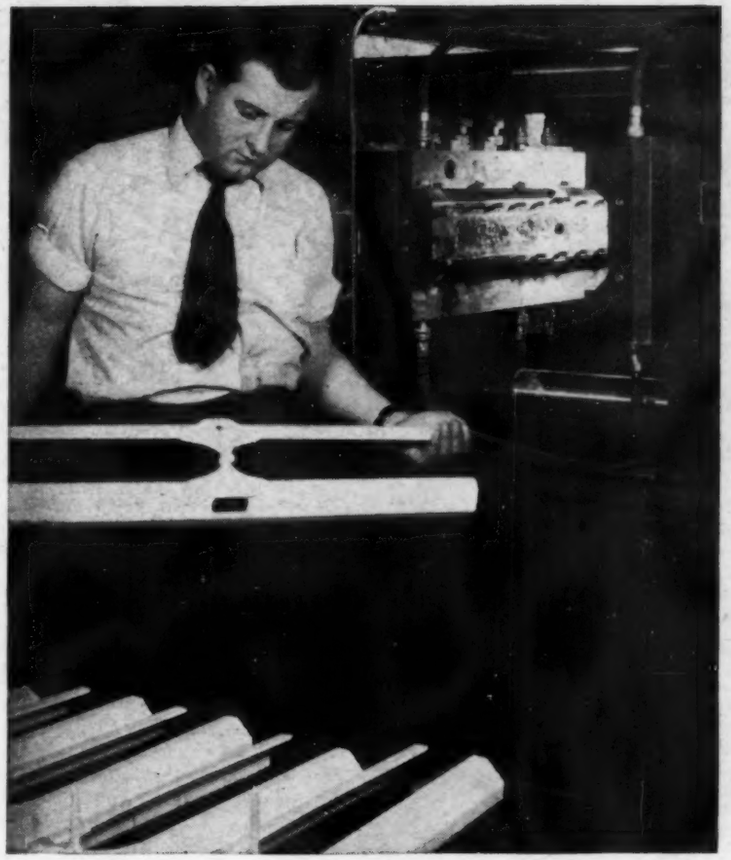
The 1,000-ft. final-assembly chain conveyors No. 1 and 2 stretch lengthwise of the first floor. The engine dress-up line chain conveyor lies at right angles to the final-assembly line, while the front-end assembly conveyor is an oval merry-go-round, parallel to the final line. Fed by the front fender and grill delivery conveyor, a 4-in. monorail from receiving, subassembly of grill, headlights and front fenders is made on fixtures mounted on moving platforms that also carry assembly workers.

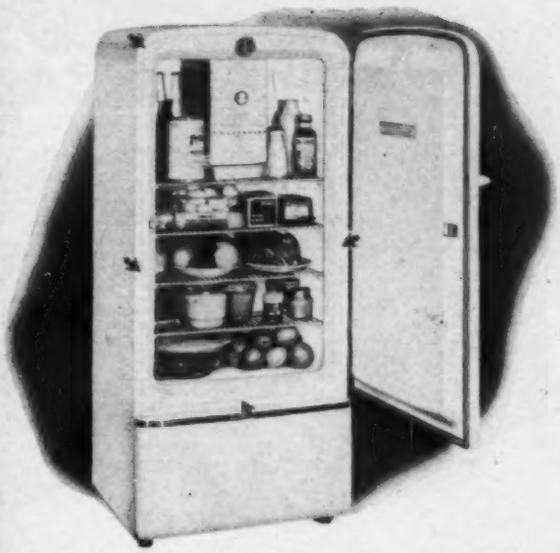
According to usual Ford practice, most of the conveyors were Ford-designed and constructed so into each unit could be built those features that best suited the physical, production and safety requirements. In other cases, standard conveyors were purchased and installed. Using both Ford-built and purchased conveyors expedited the plant-modernization program.

Now in operation, the smooth flow of materials from door to door shows the care and thoroughness that went, not only into installation of equipment, but also into pre-planning of operation sequence, floor- and air-space utilization, analysis of handling methods—all aided by the preview gained from the visual plant layout with its three-dimensional scale models.



TRUCK CABS are delivered on a slat conveyor to floor 3 where a power roll switch transfers them to a right-angle chain conveyor for delivery to inspection and storage conveyors. A limit switch, operated by the cab skid contacting end rollers, stops delivery conveyor when loaded





FOUR LONG PARTS, molded of lustrous white polystyrene, trim the food-compartment opening and the door to the freezing compartment in this Kelvinator. Dies mounted on the platens of the HPM injection molding machine at the left are heated by circulating water from thermostatically controlled electric heaters so die-cavity temperature is held within 5 F. Dies are coated with a D-C silicone emulsion to get a smooth finish and quick release of the white polystyrene molded parts

Heat Control, Metering Molds Permit Long Polystyrene Parts

BY W. F. POUPARD

NASH-KELVINATOR STAFF ENGINEER

LONG PARTS that trim the provision compartment of Kelvinator refrigerators are successfully injection-molded from white polystyrene plastic by Nash-Kelvinator Plastics Division. Sucess can be attributed to six distinct controls:

1. Spreader-type "metering" gate
2. Properly heated and controlled molds
3. Sufficient clamping pressure
4. Uniform cross-section
5. Sufficient draft angle on draw surfaces
6. Mold finish

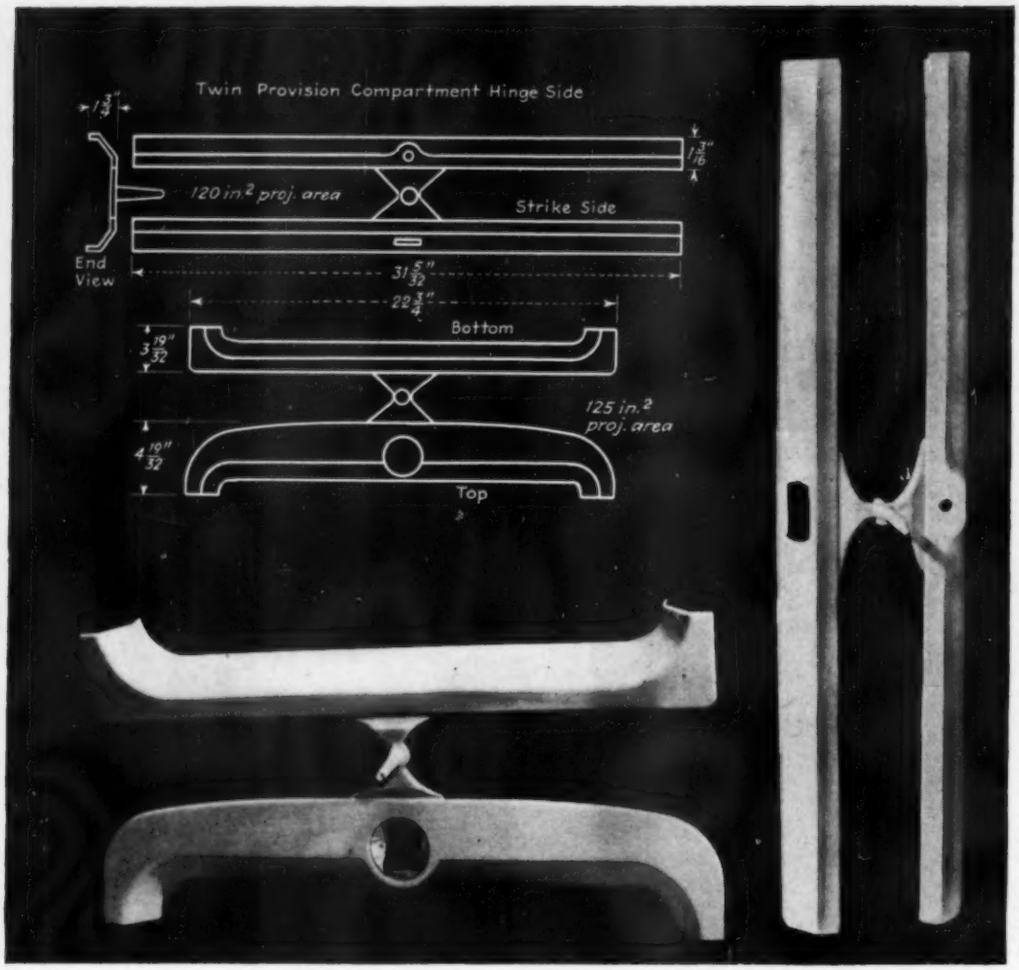
The spreader-type gate, with its "metering" design, allows greater flow of plastic material to ends of mold cavities. One mold has a material travel of 17 in. from the orifice to the end of piece.

High mold-surface temperatures are very important and improve the flow of material in long pieces. Food-compartment trim pieces are formed in molds having a surface temperature of 110 F. on the movable platen and 130 F. on the stationary one. Heating molds to these temperatures prevents the plastic from solidifying before the cavity is filled.

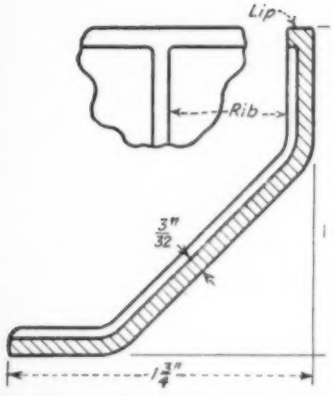
Trim for Kelvinator refrigerators produced with high-luster finish by close control of mold design. Sketches and pictures illustrate six basic principles for success

Another reason for using a heated mold is to prevent part breakage. Polystyrene parts shrink 0.003 to 0.006 in. per in. during cooling from molding to room temperature. In one longer piece this amounts to 3/32 in. The heated mold prevents the part from taking its full shrinkage in the mold, thus prevents sticking and breakage before the piece can be ejected.

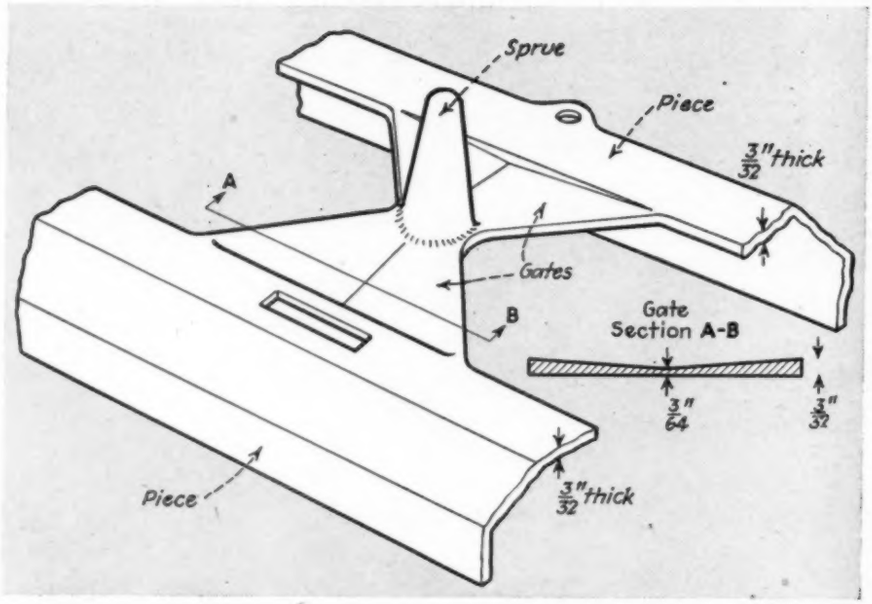
Separate circulating hot-water heaters are provided for each mold



LONG SIDE-TRIM pieces are molded of polystyrene in complementary pairs and are more than 31 in. long and 3/32-in. thick throughout. Top and bottom pieces are also molded in pairs. Relative size of the trim pieces for the food compartment are shown as they are removed from the dies. The 31 5/32-in. side pieces are long and narrow and only 3/32 in. thick. Two 2-cavity dies are required when arranged as shown. Pieces weigh close to 12 oz. a shot, requiring only three-quarters of machine capacity during each molding cycle

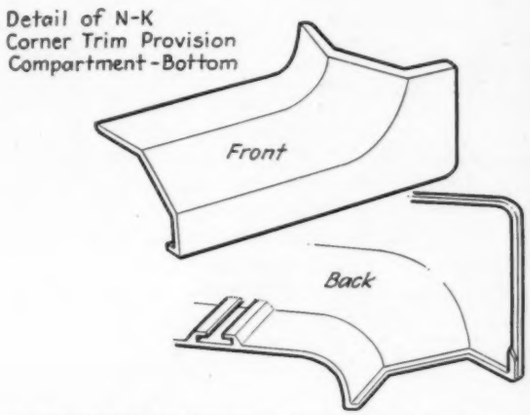


FULL-SIZE SECTON of one of the plastic trim pieces which are all made 3/32 in. thick over their entire length. At intervals, cross ribs stiffen the piece, and along one edge a lip ties the ribs together and stiffens the edge

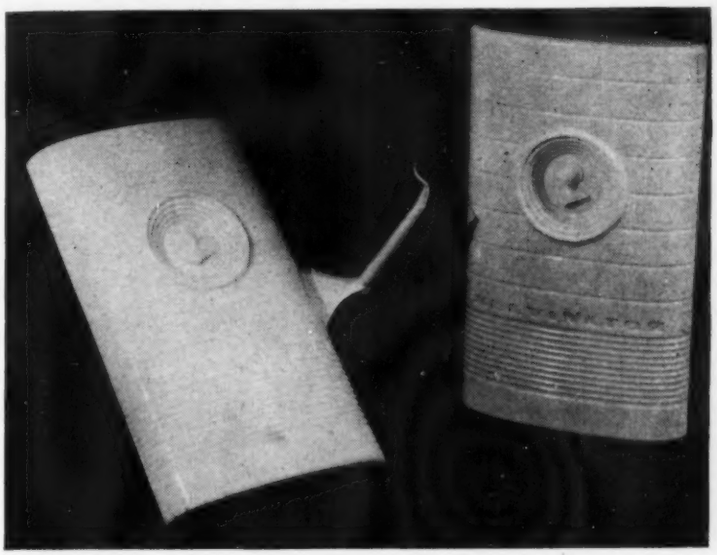


DETAIL of the sprue and the "metering" principle used with the spreader type gate. Flow of molten plastic is restricted at the center of the gate by reducing gate thickness to about half that of the piece. The major flow is therefore directed diagonally towards the ends of the mold and helps it fill out quickly. Gates are removed with a band saw. This saw should have the greatest blade length possible to allow for cooling. This increases the hourly capacity of the saw

THE 350-TON, 16-oz. capacity, HPM molding machine makes two pieces at a time. Dies are designed to make, not duplicates, but complementary pieces, i.e. right and left, or top and bottom. This saves shutdown time and increases machine operating time on low-production runs, as well as providing a balanced inventory of parts



A CORNER SKETCH of the bottom trim piece shows how the edge is ribbed and the design of one of the fastening shots. The piece is finished as soon as the gates have been removed



FREEZER-COMPARTMENT DOOR; left, as it comes from the mold; right, as it appears ready for enameling the name and medallion, with gate trimmed off

half. This permits a difference in temperature in the valves. Temperatures can be held within plus or minus 5 F.

The special twin heater used is mounted on a caster-supported truck so it can be moved from one molding press to another. This heating truck carries two water-supply tanks, each containing a 9-kw. immersion heater thermostatically controlled. Two pumps and two motors for circulating the hot water give independent control of each heating unit.

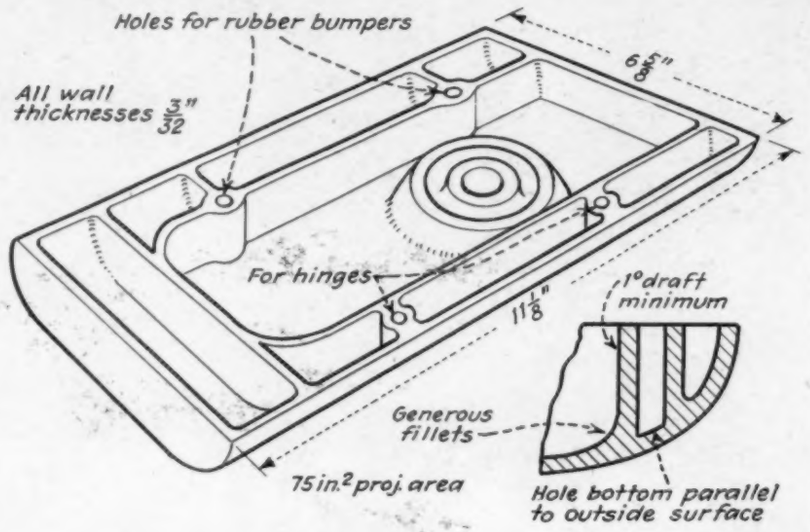
Capacity of the HPM injection molder, having 16-oz. maximum plastic-material injection per cycle and 350-ton clamping pressure, permits a 2-cavity mold to be used because total weight of the parts molded is approximately 12 oz.

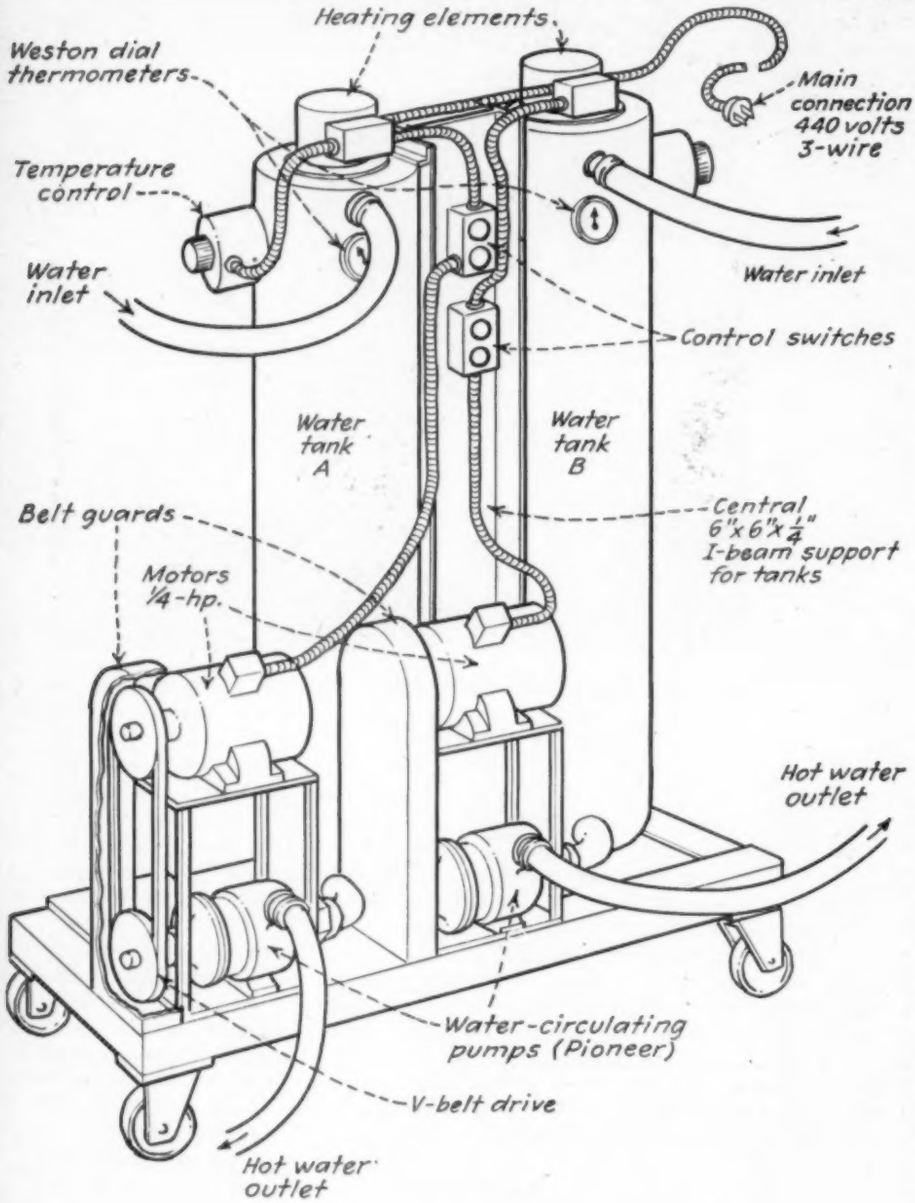
Projected area of the pieces to be molded is very important and determines the number of cavities or the size piece to be molded in any one press. Our practice is to allow a 3-ton clamping pressure per sq. in. of projected area. Although on one mold this amounts to 375 tons, parts are successfully made without flashing on this 350-ton press.

Uniform cross-sections are important to prevent sink marks which generally occur opposite heavier sections, such as ribs, bosses, etc. These sink marks will be more pronounced the greater the distance from the gate; therefore, irregular cross-sections should be avoided whenever possible, especially at extreme ends of the material travel. Sink marks can sometimes be eliminated by increasing the general cross-sectional thickness, venting the mold, running a hotter mold, or increasing injection pressures.

Sufficient draft on all draw surfaces is always good practice in de-

INTRICATE RIBBING of the freezer-compartment door gives it great stiffness and exemplifies the kind of designs that can be molded from polystyrene when molds are carefully temperature controlled. All walls and ribs are 3/32 in. thick and have at least 10 draft and generous fillets at the corners. Even wall thickness of the bosses is kept uniform by carrying the holes to the bottom and parallel with outside contour. The intricacy of the design on the front face of the door is shown in the photo on preceding page. High luster and smooth finish are obtained by using a silicone emulsion on the die cavities





HEATER TRUCK with twin hot-water tanks and circulating pumps. The two independent heating systems are used because it has been found desirable to maintain a differential of 10 to 20 F. between the molds on the stationary and movable platens, through which the hot water circulates

sign. Nash-Kelvinator's practice is 1° draft when permitted.

Mold finish is another factor that should not be overlooked when molding long pieces. The smoother finish in mold cavities naturally produces better flow properties. Finish of the exposed surface parts is also very important. Therefore, whenever a mold lubricant is required, our practice is to use Dow-Corning silicone emulsion. However, zinc stearate may be used on the back where luster and finish are not critical.

Superstition Dies Slowly

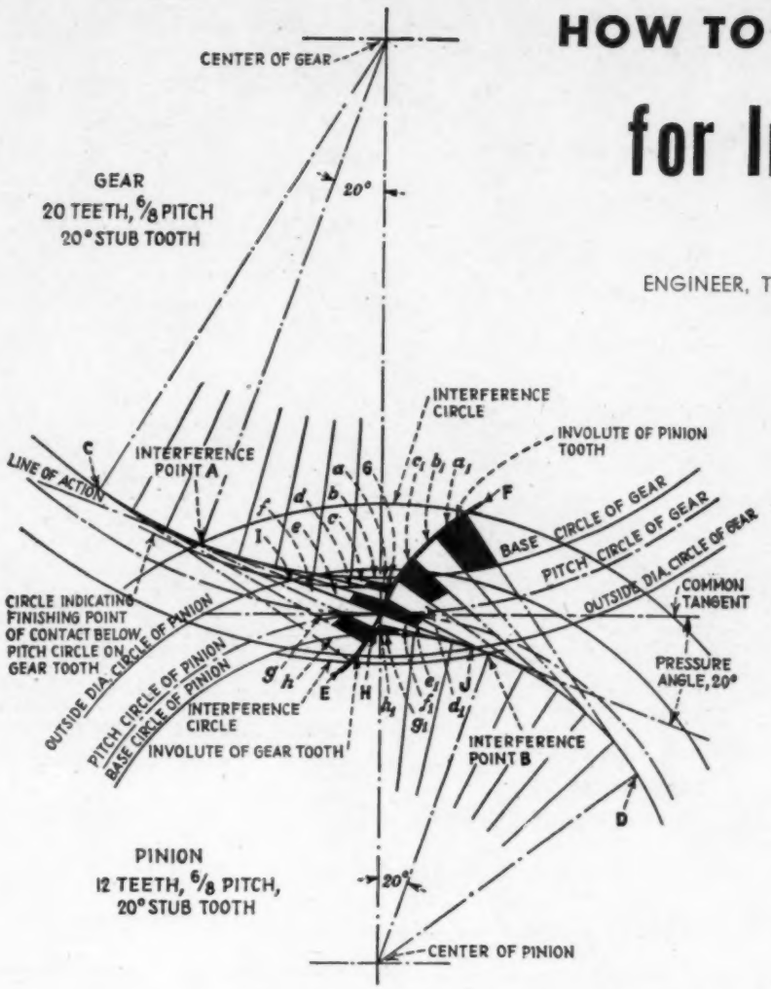
AN OLD sea chantey goes: "Old sailors never die. . . . they only sail away." The same thing goes for old wives' tales and wrong ideas. Irrefutable evidence seems unable to kill them.

Aluminum has been used as a foil for wrapping and preserving food, as a heavy foil for bottle caps on milk and medicines, and for all sorts of cooking utensils. Now it is being used as a paste in treatment of stomach ailments—one of a number of medical applications. Still we hear the old yarn that cooking in aluminum contaminates food. Such superstitions are laughable—like taking a rabbit's foot along on an airplane ride, carrying a lucky coin, or avoiding 13.

HOW TO APPLY THE FORMULA for Involute Sliding

BY BEN BLOOMFIELD
ENGINEER, THE FELLOWS GEAR SHAPER COMPANY

Six months ago, Mr. Bloomfield presented his formula. Inquiries since then prompt this further explanation of applications



Tooth action between an external gear and pinion of 20- and 12-tooth ratio, 20° pressure-angle stub teeth. Alternate shaded divisions of the involute curves of this diagram show those portions of each curve that are in contact with each other during an equal pitch-line movement of the gears. Corresponding mating surfaces are lettered, a, a_1, b, b_1, etc., on this diagram from "The Internal Gear," published by Fellows

SINCE PUBLICATION of the article on involute sliding several months ago, this question has been asked several times: "How do you apply the formula?" It is apparent that in order to find the actual sliding velocity, it is first necessary to establish some linear velocity which, multiplied by the rate of sliding, will give the sliding velocity in fpm.

That this required linear velocity is not the pitch-line velocity of the gear is apparent from a study of involute motion. In the diagram it is evident that the point of contact moves along the involute profile of the tooth with a varying linear velocity, assuming the gear to be rotating at a constant angular velocity. Portions of the involute profile marked by the letters a_1, b_1, c_1, d_1, etc., represent movements of the point of contact caused by rotating the gear by equal increment angles. Yet, the length of involute covered by the point of contact for a given angle of rotation is much greater when the contact is near the outside diameter than it is when the contact is near the base circle. Therefore, before the sliding velocity can be established, it is necessary to establish the linear velocity of the point of contact.

Let V_L = linear velocity of the point of contact. Then $V_L = \frac{ds}{dt}$, where s = instantaneous length of involute traversed by the point of contact.

But, $ds = aGdG$, where
a = base circle radius
G = total angle of involute
(See original article)

(1) $\frac{ds}{dt} = V_L = \frac{aGdG}{dt} = aG\omega$,
since $\frac{dG}{dt} = \omega$ = angular velocity

Angle G for any radius L is defined thus:

(2) $G = tan\left(arc\ cos\ \frac{a}{L}\right)$

Formula (1) may be used to define the linear velocity of the point of contact at any given angle G, and G may be determined, for any given radius L, from (2). If G_1 and G_2 denote the total angles of involute to the point of contact of a pair of mating gears, the relationship between the two angles is:

(3) $G_2 = G_r - \frac{n_1}{n_2}(G_1 - G_r)$,

where n_1 and n_2 represent the numbers of teeth and
$G_r = tan\ (active\ pressure\ angle) = tan\left(arc\ cos\ \frac{a_1}{r_1}\right)$, where
a_1 = base circle.
r_1 = active pitch radius.

It is evident from formula (1) that the linear velocity, hence the sliding velocity, is zero when contact occurs at the base circle, since angle G is zero at the base circle. Hence, in order to find the sliding velocity at this point, or at points of contact near the base circle, it is desirable to consider the mating gear where contact occurs near the outside diameter. Let subscript 1 refer to the pinion and subscript 2 refer to the gear. From the article on involute sliding, it has been established that:

(4) $S = 1 - \frac{G_1}{G_2}$, where S = rate of involute sliding.
Let V_s = Linear velocity of sliding.
Then, $V_s = V_L S$

(5) $V_s = a_2 G_2 \omega_2 \left(1 - \frac{G_1}{G_2}\right)$
$= a_2 \omega_2 (G_2 - G_1)$

Formula (5) provides a simple and direct means of finding the actual sliding velocity at any given point of contact. The computation of sliding velocities has assumed importance in recent developments of gear strength and wear formulas. The following examples illustrate the use of the formula (5), together with formulas (2) and (3):

Example I

Two 20-tooth pinions—500 rpm.—$n_1 = n_2 = 20$ — 10 D.P. — 20° pressure angle — O.D. = 2.200 in. — center distance = 2.000 in. Find the sliding velocity at the outside diameter.

$L_2 = 1.100$ in. $a_2 = 1.00 \cos 20° = 0.93969$ in.

$G_2 = \tan \left[\text{arc } \cos \left(\frac{0.93969}{1.100}\right)\right]$
$= \tan (\text{arc } \cos 0.85426)$
$= 0.60854$

$G_r = \tan 20° = 0.36397$

$G_1 = 0.36397 - \frac{20}{20}(0.60854 - 0.36397)$
$= 0.11940$

$V_s = \frac{0.93969}{12} \times 2\pi \times 500\ (0.60854 - 0.11940)$

$V_s = 120.3$ fpm.

Example II

20-tooth pinion meshing with 100-tooth gear —

$n_1 = 20$ $n_2 = 100$ 10-pitch, 20° P.A., 500 rpm. pinion,

$L_1 = 1.100$ in. $L_2 = 5.100$ in. C. D. = 6.000 in. Rpm. gear = 100

$a_1 = 1 \times \cos 20°$ $a_2 = 5 \times \cos 20°$

$a_1 = 0.93969$ in. $a_2 = 4.69845$ in.

$G_2 = \tan \left[\text{arc } \cos \left(\frac{4.69845}{5.100}\right)\right] = 0.42218$

$G_1 = 0.36397 - \frac{100}{20}(0.42218 - 0.36397)$
$= 0.07292$

$V_s = \frac{4.69845}{12} \times 0.42218 \times 2\pi \times 100 \left(1 - \frac{0.07292}{0.42218}\right)$

$V_s = 85.92$ fpm.

Example III

100-tooth gear meshing with 100-tooth gear —

$n_1 = n_2 = 100$ 10-pitch, 20° P.A., 100 rpm.

$L_1 = L_2 = 5.100$ in. C.D. = 10.000 in.

$a_1 = a_2 = 5 \cos 20° = 4.69845$

$G_2 = 0.42218$

$G_1 = 0.36397 - \frac{100}{100}$
$(0.42218 - 0.36397) = 0.30576$

$V_s = \frac{4.69845}{12} \times 0.42218 \times 2\pi \times 100 \left(1 - \frac{0.30576}{0.42218}\right)$

$V_s = 28.64$ fpm.

Example IV

20-tooth pinion meshing with a rack 10 P., 20° P.A.
$L_2 = 1.100$ $a_2 = 0.93969$ 500 rpm. of pinion

Here, the formula for the rate of sliding is:

$S = 1 - \frac{\tan P.A.}{G_2}$

$V_s = a_2 \omega_2 (G_2 - \tan P.A.)$

$G_2 = 0.60854$ $\tan 20° = 0.36397$

$V_s = \frac{0.93969}{12} \times 2\pi \times 500\ (0.60854 - 0.36397)$

$V_s = 60.17$ fpm.

TIPS for Top Shop Men

198 Be sure neither you nor your company becomes a slave to one process or one system. Recent developments constantly shift the process picture in terms of cost, finish or simplicity; further experience or organizational changes may outmode a system.

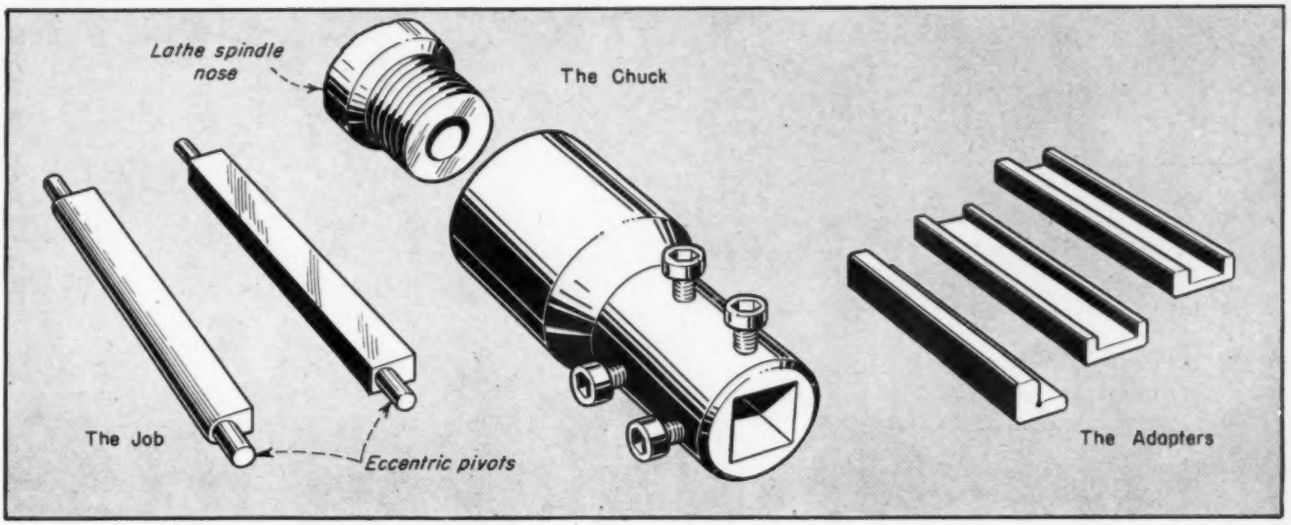
199 Prejudice bars progress. Don't imitate the legendary old New Englander, who said, "Yep, there's been lots of changes in my lifetime—*and I was agin every one!*"

200 Try to keep your working force balanced—in age, in skill, in personalities. That builds versatility and flexibility.

201 Take special care of the "green" hand—without making it obvious. One way is to "slip" him a card or memo listing the steps or tricks of the trade on his new job. If you're sincere and quiet about your help, he'll appreciate it—and appreciate you, too.

OUR SHOP...27 — *Special Products Dept.*

Practical Ideas



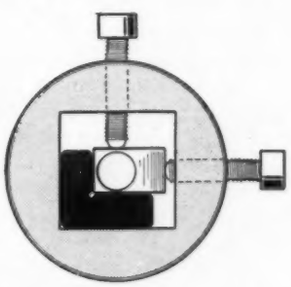
Eccentric Pivot Bars Made In Square-Bored Adapter Chuck

Long slender rectangular bars had to have eccentric bearing pivots turned on both ends on a precision production basis. A chuck was turned from round barstock, threaded to the lathe spindle nose, broached internally to make a centered square hole, and then hardened and ground.

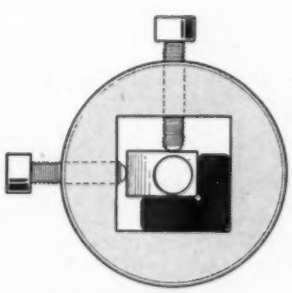
Several close-fitting adapters were made to slip into the chuck to take the several sizes of partly finished work and hold them in correct position for the pivot turning. The chuck body was equipped with suitable radial screws for clamping the positioned components.

The chuck remains a standard tool for any subsequent work of similar nature; new adapters can always be made to perform the final fitting job when more work comes along, or if a new job should be too short to warrant a hardened and ground adapter, the required setup can be made almost as well with shim stock.

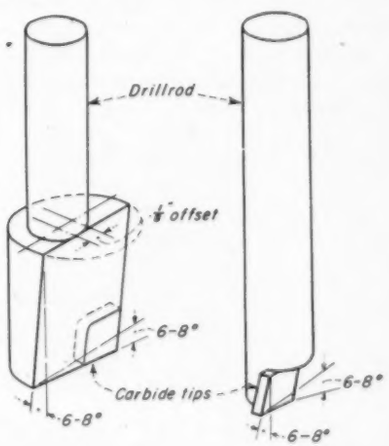
Compared to any other method, this chuck permits faster and more accurate work, and its cost is so low that it will easily pay for itself in a short time. With the almost infinite number of possible adapter shapes, irregular parts of nearly any cross-section can be chucked, regardless of length, and have work of any kind performed on the ends. This is an excellent way, for instance, of putting lathe center holes in the ends of irregular pieces so they can be mounted between centers for further work. *S. Framurz, Bombay, India.*



1st Chucking Position is immaterial provided the piece is correctly located. But a common error frequently occurs when the work is turned end for end in relocating.

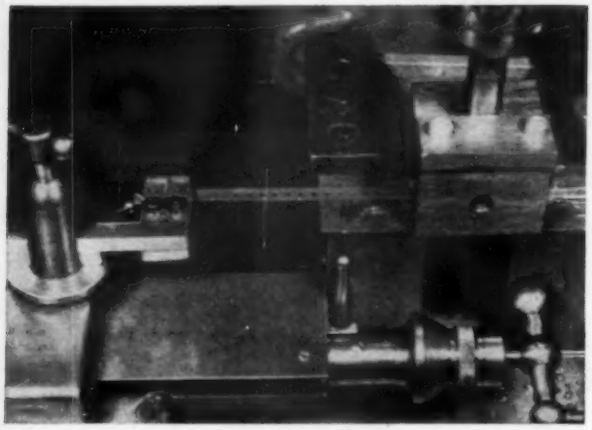


2nd Chucking Position requires that adapter and piece be reversed horizontally or the second pivot will not be aligned with the first.



Carbide End Mills—An experiment to save wear and tear on expensive high-speed end mills, this and two more carbide-tipped mills are still going strong after a year of daily service.

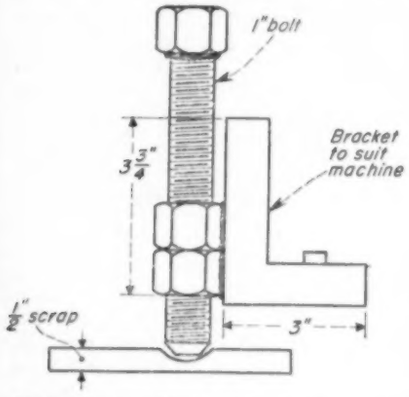
In a ½-hp. vertical miller, the larger of these tools surfaces work faster than possible in a shaper and with a finish that approaches grinding. They have also proved themselves particularly suited to difficult slotting work. *C. W. Pressey, Belle Mead, N. J.*



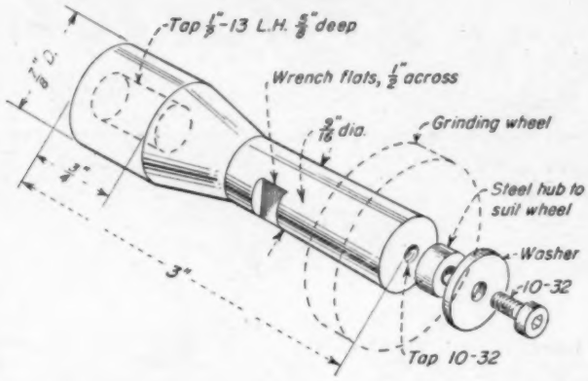
Lathe Controls Spacing

We had to make several small phosphor-bronze transmission belts notched like movie film for some precise instrument drives. The hole spacing had to be within 0.0005 in. for any two holes and have zero cumulative error. This practically eliminated the possibility of punching each hole while locating from the previous hole because an error of only 0.0005 in. between adjacent holes would be very serious if built up.

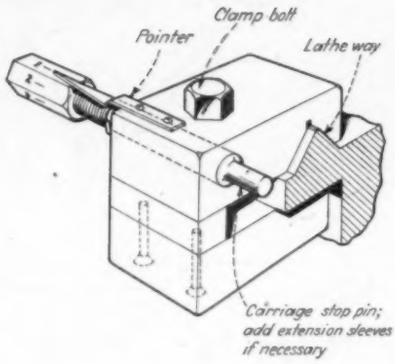
The desired accuracy was attained by clamping one end of the belt stock on a compound rest borrowed from a lathe. The punch and die were mounted in the drillpress and the compound rest was advanced the proper intervals with the handwheel and its dial for each 0.070-in. square hole. *J. C. Magee, Schenectary, N. Y.*



Offset Jack—Moving a 12-ton pump into position, setting and lining up without a crane was a difficult problem. Then I had a welder make up one of these jacks which hooked under the frame and raised the pump with ease. Four more of them and setting up problems were over. *Wm. J. Coles, Stephenville, Texas.*



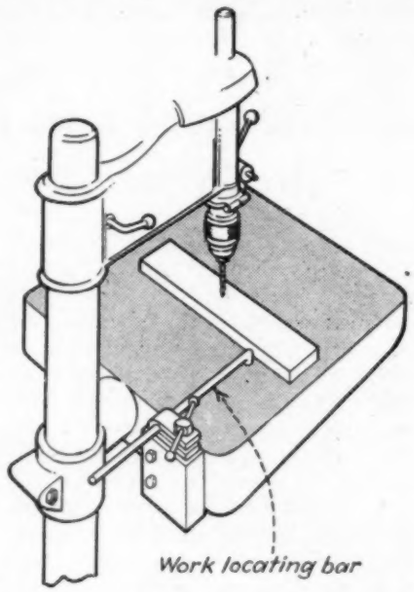
Grinder Atachment — This spindle adapter for surface grinders provides a convenient way to mount small wheels to grind internally or in confined places. The spindle extension replaces the usual left-hand nut on the grinder spindle. *George A. Giller, Glen Ridge, N. J.*



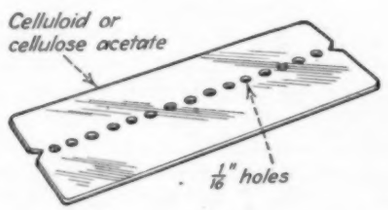
Lathe Carriage Stop—Here is a good longitudinal carriage stop that will do the work of standard lathe micrometer stops and perform other duties as well. The screw, in this case ½-in.-20, provides an advance of 0.050 in. each full turn and is divided into six intermediate positions for finer graduating.

For production work where several longitudinal settings are required the screw can be backed off so only the pin projects and tubular gage blocks or sleeves can be slipped over the stop pin for any predetermined setting. Such a sleeve or sleeves will then measure directly from the face of the stop block to the carriage.

We have a full set of these extension blocks, hardened and ground, from 0.050 up to 0.250, and then starting at the anvil of the adjusting screws which extends 0.750, we have an assortment up to six inches. The advantage of this type of measurement is that the stop itself can be clamped on the lathe ways once and remain there without further adjustment while all measurements are made by changing the combination of extensions. *Allan B. Nixon, Springfield, Mass.*



Drillpress Stop—Two or three of these easily assembled and quickly positioned work stops permit rapid drilling on a small lot of like pieces regardless of part shape or size. *Lloyd Sturmp, Adair, Illinois.*



Dashed Lines—To change solid lines on drawings to broken lines, place this shield over the work and erase. *Henry H. Moore, Brooklyn, N.Y.*

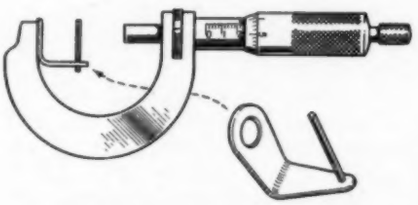
Lathe Setup Cuts Lugs—We had to make various small cups in quantities of 50 to 100 for experimental radio work. After drawing, there remained the problem of cutting lugs on open end and squaring off the feet.

This job was done on a lathe with a double-bit tool in the compound. The first "punch" element was a piece of bar chucked in the headstock which had three solid lugs corresponding to those desired on the part, and having a central pilot hole. Into the hole fitted another piece of the same outside diameter, shaped to fit the inside of the cup.

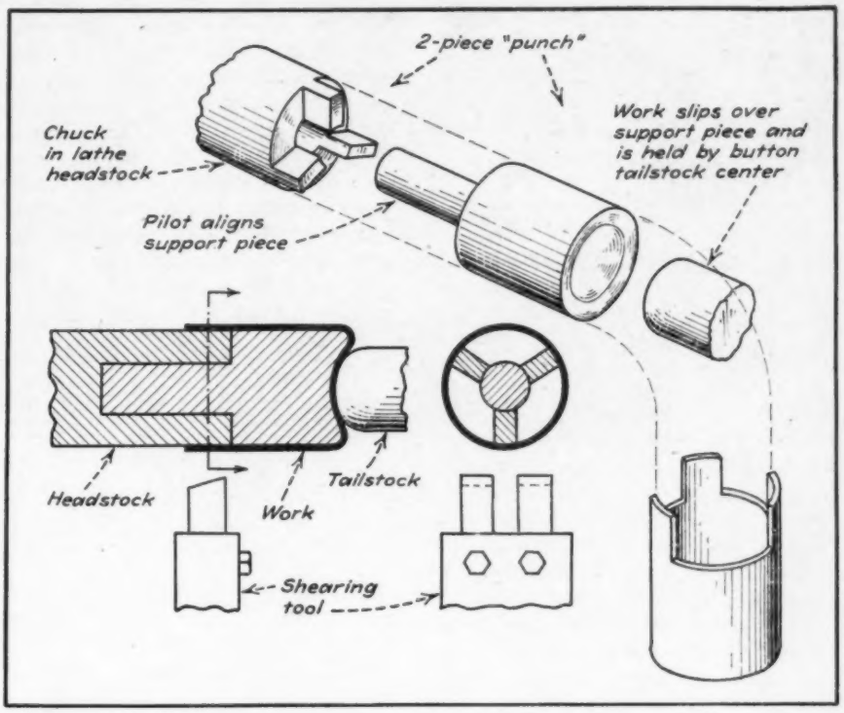
When the cup is slipped into place, a button-nosed tailstock center is brought up to hold the three parts lightly together. The work can be lined up by reference to the jaws of a 3-jaw chuck, and no special locking should be necessary as there is no tendency to turn the work.

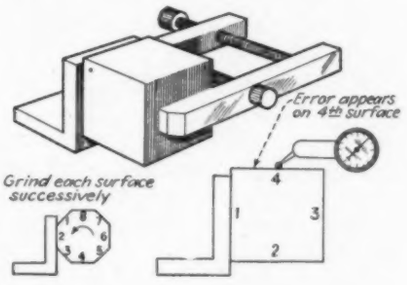
The lugs are cut with two toolbits mounted together and properly spaced to permit horizontal shearing action. *Donald A. Baker, Boonton, N. J.*

Inside Countersink — 1200 brackets were jig-drilled and required burring. The holes penetrated one part of the bracket which was backed up by another plate at a close distance, making the inside of the holes difficult to reach. We used hand scrapers until this tool, made from an old lathe center drill, was made. Now, time and labor have been considerably reduced. *Allan B. Nixon, Springfield, Mass.*



Checking Drilled Bolts—A piece of steel, drilled, bent, and fitted with a drillrod pin, and the whole fitted to a micrometer anvil provides a convenient way to gage a transverse hole in round stock for center. The distance from the pin to the fixed anvil should be large enough to clear the largest bolt or rod, but not over about 0.400 inches. The rod can now be slipped over the pin two ways and the pin-to-side distances checked with the spindle. *Franz Sauerisch, Detroit, Michigan.*

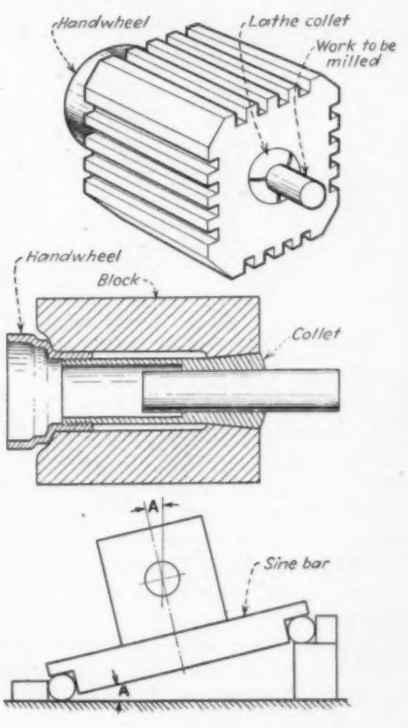


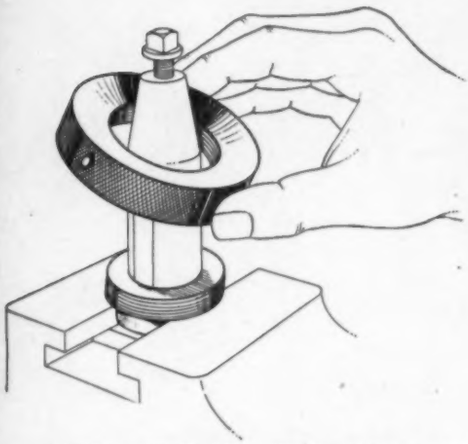


How to Check Angle Plates—Clamp a square piece of cold rolled steel bar stock against the angle plate to be tested and clamp the angle plate on a surface grinder. Successively grind each face of the steel block turning the freshly ground side toward the angle plate each time. After all four sides have been ground, turn the block once again and indicate the first side with a dial test indicator. If the indicator shows an error of 0.004 in. then the angle plate is in error by only 0.001 in.

If a more accurate check is required, use a piece of hexagonal or octagonal bar stock which will then multiply the error by six or eight. *Theodore A. Buza, Milwaukee, Wisconsin.*

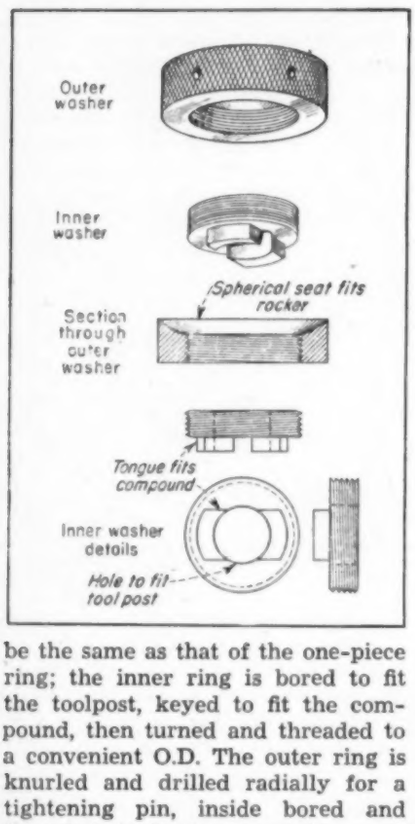
Squaring Rods—Cutting or grinding flats on small rods on opposite sides or on more than two sides can be a nuisance when a lathe chuck has to be located for each cut. This small block, taking standard collets, performs these, and many more jobs at a single chucking, as the whole block can be moved to various tools for the required operations. *George E. Jones, Maple Heights, Ohio.*





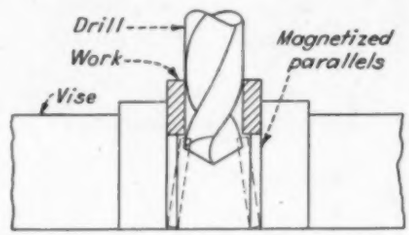
Lathe Toolholder Jack—About to be screwed on its inner, keyed ring, this spherical washer will adjust the tool height accurately without disturbing the rake-angle setting. Formerly, tool height had to be adjusted by rocking the rocker in the standard one-piece ring which this adjustable ring replaces. Fine rake-angle and center-height adjusting, as in thread chasing, for example, are now possible simultaneously, and the old bother of one or the other is eliminated.

Over-all size of the unit should

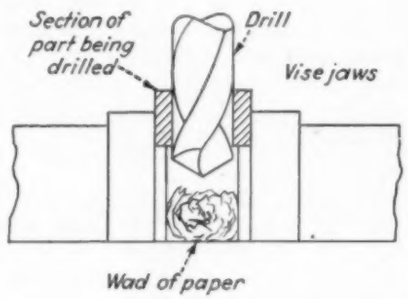


be the same as that of the one-piece ring; the inner ring is bored to fit the toolpost, keyed to fit the compound, then turned and threaded to a convenient O.D. The outer ring is knurled and drilled radially for a tightening pin, inside bored and threaded to fit the inner ring, and concave faced to fit the rocker. *M. S. Khaja Hohideen, Madras, India.*

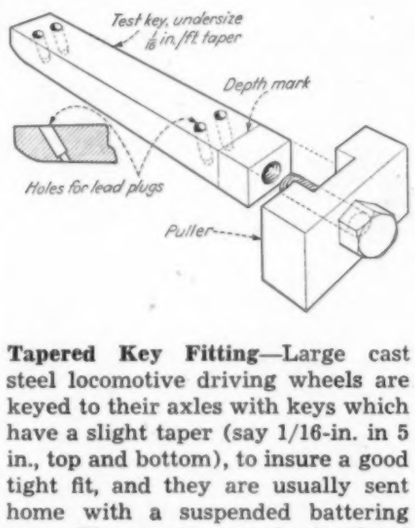
Drilling Parallels—In toolrooms or machine shops, quite frequently through holes must be drilled almost as wide as the stock. After the drill has gone all the way through the stock, the remaining wall is rather thin, necessitating the use of unusually thin parallels. Occasionally, these unstable parallels are not perfectly upright and may interfere with the drilling operation. This can easily be overcome by magne-



tizing the parallels so they will cling to the vise jaws. This eliminates all interference, letting the drill go all the way through the stock. If unmagnetized parallels are used, a



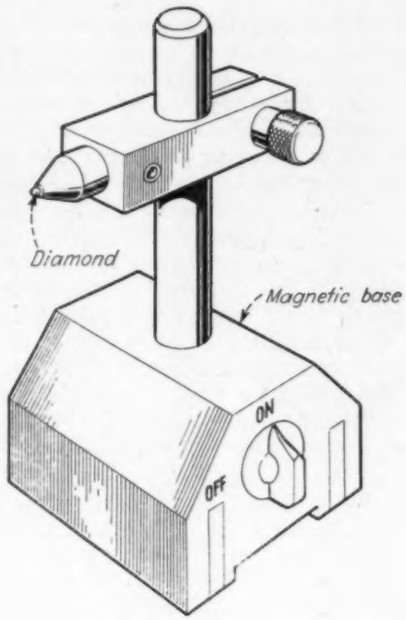
wad of paper placed between them will keep them apart and serve the same purpose. *Cliff Bossmann, Dayton, Ohio.*



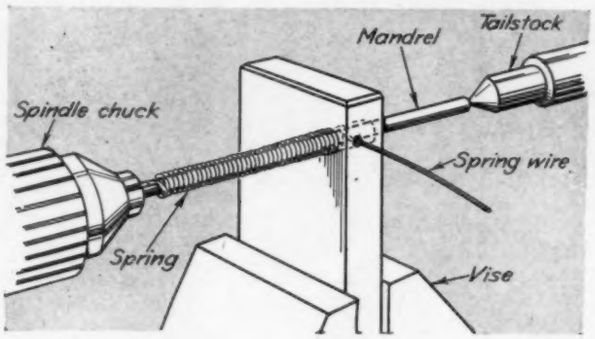
Tapered Key Fitting—Large cast steel locomotive driving wheels are keyed to their axles with keys which have a slight taper (say 1/16-in. in 5 in., top and bottom), to insure a good tight fit, and they are usually sent home with a suspended battering ram. The aperture at the inside of the wheel key seat is usually small because the axle key seat ends there with a radius. This makes it impossible to measure from the back of the wheel.

For accurate fitting we used a test key which is slightly undersize and has a mark scribed around near the thick end indicating the desired depth of the service key. In addition, the test key has holes drilled across the taper near the thick end and near the thin end in which lead pellets are inserted. The key is then driven in with a mallet until the depth mark comes flush with the face of the wheel. Then a puller is placed over the key and the key withdrawn. Measurements are now taken across the squashed lead pellets and the service key is made accordingly. A little practice will enable a fitter to estimate the proper allowance for any degree of force-fit desired.

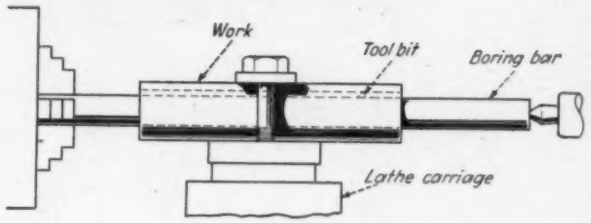
This method can be used on any job where long slightly tapered keys have to be fitted into blind or nearly blind key-ways. *William Holmes, Glasgow, Scotland.*



Magnetic Wheel Dresser—A standard magnetic base makes a convenient mount for a dressing diamond. The diamond holder can be slid along the vertical rod or clamped in any position and moved across the wheel with the machine feeds. *D. E. McDonald, Sunnyside, Long Island, N. Y.*

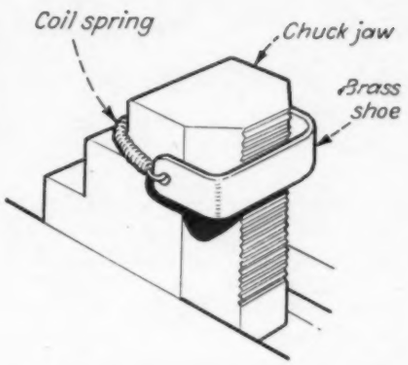


Spring Winder—With a mandrel on centers for the spring's I.D. and a block to form the O.D., wire is fed under tension through a side hole onto the mandrel. Coil spacing is effected with the leadscrew and change gears. *Lee Tool Co., Cleveland, O.*

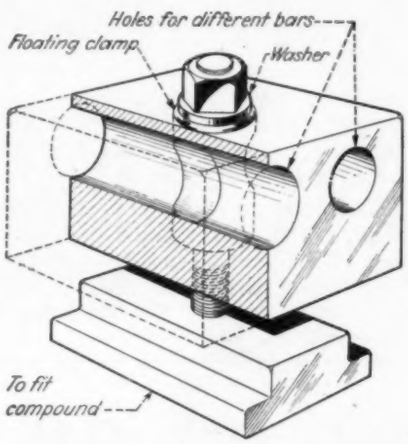


Reversed Boring—Pieces which are difficult to chuck because of outside irregularities or extreme length, requiring steady or follow rests and unsupported long boring bars, are easy to machine when mounted on the carriage while the boring bar is mounted between centers.

Of course, the bar must be stopped to make adjustments, but with this arrangement it is easy to put several bits in the bar at different radial and longitudinal positions for rough and finish cuts, and the arrangement can be such that bending forces will be pretty well equalized. *Arthur F.Hird, Lakeview, Ontario, Canada.*

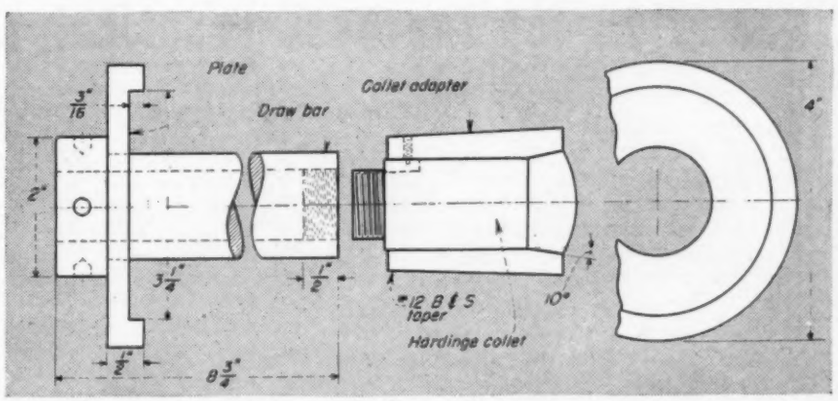


Chuck Shoe—Solid clamping of soft stock which must not be marred is difficult with a standard lathe chuck unless shims are used. But the insertion of three or four shims, centering, tightening and meanwhile holding the work in position, almost requires the arms of an octopus. We made some little U-shaped brass shoes to fit our chucks and they have worked out very well. A light coil spring makes the shoes adaptable to various sizes of jaws, but the shoe could be made in the form of a spring clip (one-piece) thus eliminating the coil spring. *Clement Reichel, Cleveland, Ohio.*



Boring Bar Holder—Our plant has used this boring bar holder for many years. It will accommodate almost any size bar up to the largest hole diameter and will always hold the bar level and on the center line.

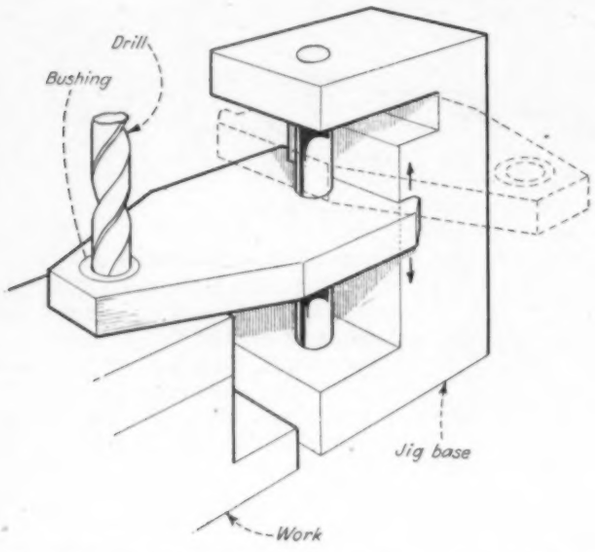
The vertical clamping hole is bored in the block and the screw, nut, washer, the floating sleeve, and the T-head are assembled and the block is clamped in the compound rest. Longitudinal holes are then bored from the headstock so as to nick the sides of the floating piece without going through to the screw. Now when bars are inserted the float will grip the bar as the nut is tightened, holding the block and bar at the same time. Various sleeves or bushings are used to fit smaller bars. Bar length is quickly adjusted by sliding in and out before final tightening. *C. W. Lightfoot, Los Angeles, California.*

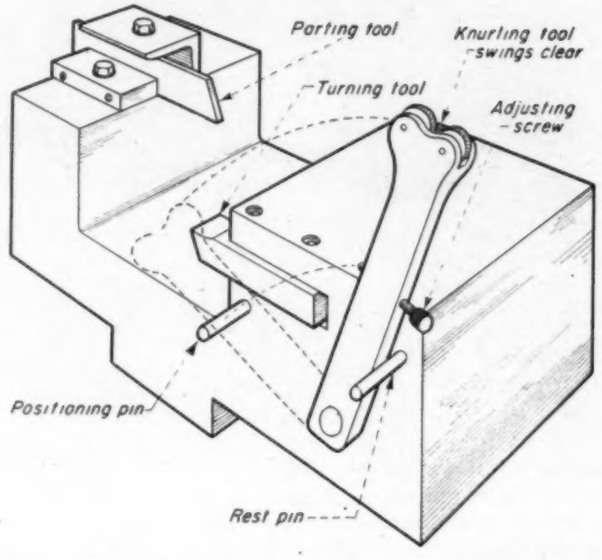


Collet Adapter—We now can use all our Hardinge collets on our Cincinnati No. 2 cutter grinder workhead with the aid of this simple attachment. The principal component is the simple taper bushing sleeve which fits the machine spindle on the outside and collets on the inside. Besides this, there is a suitable drawbar and thrust plate to fit the machine.

The 1/64-in. increments in collet sizes make this adaptation particularly suitable to work of irregular size and to jobs which can't be mounted between centers.

The attachment assembles and dismounts very quickly, and of course, it should be equally suitable for other machines with only minor variations. *C. Clarke, Toronto, Ontario, Canada.*





Adjustable Height Drill Jig—Here is a jig which clamps easily to the drillpress table when the drill is temporarily fed down through the bushing.

The bushing plate slides vertically on its pivot pin and is guided by the side of the jig column. Near the top is a deep notch which frees the bushing plate and permits it to swing out of the way for changing drills or work.

These features allow the tool to adjust to various work thicknesses and hole diameters to provide the maximum steadying for long slender drills thereby preventing drill walking, cocked holes, out of line holes, and broken drills. *H. Moore, Leeds, England.*

Multiple Toolholder — Short run production can be speeded up by making an inexpensive turning head, such as is shown in the accompanying sketches. It is extremely valuable for turning such items as bushings with knurled heads, screws, pins, and various other parts.

The toolholder is made to fit a bench lathe but was later adapted to fit a larger model. The holder consists of a block of steel cut to shape which carries two tool bits and a special knurling toolholder. The parting tool is set upside down which makes it easier for the chips to fall away and clear the tool.

The knurling tool is brought forward when in use and lifted back out of the way when not in use, at which time it rests against the pin. *Arnold Dyck, Port Credit, Ontario.*

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Requirements—Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product — in terms of its usefulness to them.

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34th Selection—George Giller's Ball Turning Method

NEWS OF METALWORKING

Effects of Steel Price Increase Studied by Metalworking Companies

PITTSBURGH — General price rises for steel came as no surprise to metalworking consumers, but the size of the increase, ranging from $5 to $10 a ton, was more than many expected. Announcements of advances in steel prices served to clear the issue, which has been under debate since the soft coal settlement.

Prior to the actual announcements, most fabricators felt the steel price rise would average $5 a ton. This was counteracted by the parade of price boosts, and was culminated by the increases announced by the two largest domestic producers, U. S. Steel Corp., and Bethlehem Steel Corp.

Actually, the soft coal settlement, and its attendant effect of higher operating costs for mills, served only as an opportunity to raise prices. Full impact of higher coal costs might conceivably lead to another price rise, according to some industrial analysts.

Factors Behind Rise

Steel mills were known to be eyeing price rise possibilities to meet a series of events that had boosted costs of producing steel since the first of the year. The major factor was a $10 increase in the price of scrap since the first of the year. Some industry observers felt that if the scrap rise had not set in, the present increase in steel prices might have averaged $3 a ton.

Other price-hiking events were: 15-cent an hr. price rise given steel workers in April; 17% increase in freight rates effective Jan. 1; new construction and expansion costs; increase in cost of non-ferrous metals essential to steel production. Other factors are increased maintenance costs, boosted lake shipping charges, and other "hidden" costs.

Capacity Becomes Political

In the face of the price rise, the steel industry is being urged to further expand its facilities to meet demand. Capacity of the steel industry is becoming political as well as a business issue.

No immediate Governmental action is in sight, but the possibility of Government moves to stir up construction of new capacity—both ingot and fabricating—is due to be loudly debated in the coming campaign year.

Industry representatives, such as Walter S. Tower, president of the American Iron and Steel Institute, have been insisting present capacity is adequate to meet normal demand for years ahead. Wilfred Sykes, president, Inland Steel Co., claims present capacity will prove adequate through 1975.

42,267,000 Tons of Output

A tabulation for the first six months of this year shows steel production exceeded output of any previous six-month peacetime period in history. An estimated total of 42,267,000 tons of ingots and steel for castings was turned out during the period.

Automobile manufacturers, largest users of steel, have been clamoring for more sheet steel. Inventories have not been built up to assure unhampered production of cars and trucks to meet market demands, they claim.

Steel companies point out, however, that automobile manufacturers received nearly 3 million tons of steel during the first four months of this year. They point out that much of this steel was used for trucks—claiming that 423,237 trucks were produced during the first six months of 1947. Beyond that, they point to the substantial amounts of steel going into automotive parts for replacement purposes.

Impact of the steel price increase was noted with General Motors' announcement of hikes ranging from 2 to 6% on list prices of its cars. Other auto makers were studying effect of the steel price boost and were withholding comment.

Price Picture Analyzed

Fabricators in other metalworking fields likewise were withholding comment on price changes. Manufacturers of railroad equipment, farm equipment, household appliances and a host of other items are analyzing effects of increased steel prices. Some spokesmen said they couldn't see how increased prices for their products can be avoided.

Inflationary interpretations are the major consideration in determining price rises. Some observers believe increased prices will not alter demand for many products, but others might draw strong consumer opposition.

The specter of a recession still hovers over the subject of price increases. Administration appeals have been veiled in warnings against upsetting the economic cart. This has served as a brake, to some extent, on arbitrary price increases.

Shipments to Auto Industry

NEW YORK — In the first four months of 1947, sheet and strip shipments to the automobile industry totaled 1,856,815 tons, of which 694,751 tons went to independent parts, accessories and supplies producers, 1,037,226 tons to automobile plants, and 124,838 tons to production of trucks.

Improved Ford Tractor rolling off the production line at the rate of 400 daily features an improved hydraulic system for implement control and four forward speeds. Implements used on older models can be attached to this new all-purpose light-weight tractor, whose overall weight has been increased about 200 lb.

Gaging Business

Operations at High Level

The metalworking industries are operating at an amazingly high level for mid-summer. Output is suffering somewhat here and there by plant shutdowns for vacations. And the persistent shortage of materials, particularly steel, has held down production in some lines.

▸ Orders continue in good volume. But there has been a slackening compared with earlier in the year. In many segments of metalworking, production is outstripping new bookings.

▸ Main concern at the moment is rising costs, set off by the hiking of steel prices.

Steel Prices Cause Stir

The stiff rise in steel prices the past week caused quite a stir among users. Many consumers will pass along the increases in the form of higher prices, as General Motors has done with its cars. But others will maintain a "watchful-waiting" policy. A few, like Timken Roller Bearing (also a steel producer), will hold the price line at least until year's end.

▸ One prominent steel manufacturer claims that steel costs have soared $11 a ton since the first quarter of the year.

Steel Output Near Top

Steel production continues to push top limits without satisfying many users, who say that they cannot expand their operations further because they cannot secure more tonnage.

▸ Most spectacular of the steel shortages has been in the automotive industry. Periodically, automotive assemblies have been curtailed by lack of enough body sheet steel.

Machine Tool Sales Fair

Preliminary check shows that July machine tool business held up well for a mid-summer month. Shipments suffered some because many builders closed for one-week or two-week vacations.

▸ June provided a surprise, with new orders the highest of the year, at $22.6 million. Incoming business is widely distributed among user industries, with automotive concerns leading in dollar volume.

Foreign Orders Dwindle

Machine tool production of $159 million in the first half of 1947 confirms the long-held belief that the year's total in dollars will be close to $300 million. The steadily dwindling percentage of foreign orders is a source of concern.

▸ Whereas at the year's start, export sales comprised 29% of the industry's total, in June it had declined to slightly under 20%. Russia is purchasing very little, and other European nations are short of dollars. Many builders, as a result, are cultivating Latin America intensively.

Russia Buys Surplus Tools

Sweden, Switzerland and Belgium have placed machine tool orders with U. S. builders. At a surplus sale at York, Pa., Russian and Czechoslovakian agents are reported to have consistently outbid domestic buyers. France and Finland are expected to take some surplus equipment soon.

▸ Recent increases in steel prices will not bring immediate advances in machine tools. If there are general upward adjustments in wage rates of employees of machine tool companies, however, further rise in prices may be imperative.

Foundry Equipment Orders High

The gearing industry suffered a decrease of 11% in its June business compared with May, as reflected in sales by members of the American Gear Manufacturers Association.

▸ New foundry equipment orders jumped sharply in June. The June sales index figure was 658.9 (monthly average 1937-39 is 100), as against 525.9 in May. In fact, June was the best month in a 12-months' period.

▸ Repair orders for foundry equipment also were well sustained. June was approximately the same as May, but registered a low point for the year on the index.

Farm Equipment Demand Holds

There is no sign of slackening in the farm equipment industry. Output is far greater than a year ago, when builders were beset by strikes.

▸ Last year, 252,000 tractors were made. The rate this year far exceeds that of 1946. Nevertheless, waiting lists of buyers are long.

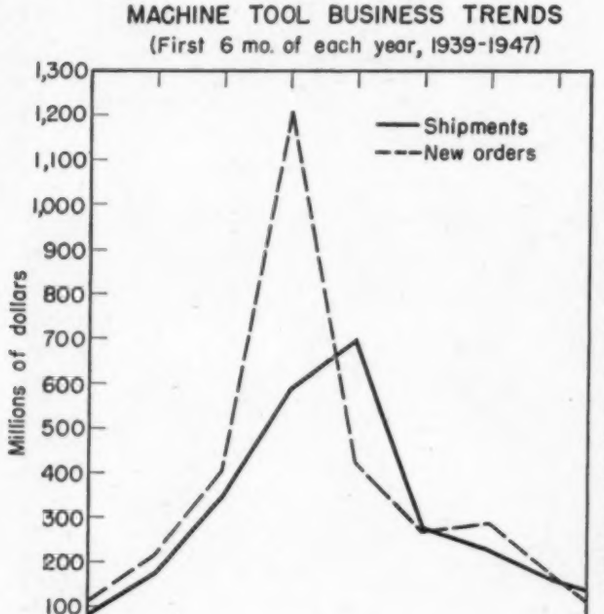
▸ New products, such as mechanical cotton pickers and self-propelled combines, are swelling demand. New pick-up hay balers are especially popular.

Vacuum Cleaner Sales Soar

The vacuum cleaner industry's performance is typical of that in the household appliance field. In the first six months of this year 1,831,840 units were made, or 80% of the total for all of 1946. The number was 9.6% more than were manufactured in the biggest prewar year, 1941.

▸ Electric refrigerator people are continuing to be limited by the amount of steel they can get. Not until the fourth quarter will they get into full stride.

MACHINE TOOL BUSINESS TRENDS
(First 6 mo. of each year, 1939-1947)



Source: National Machine Tool Builders Association, War Production Board

Machine Tool Shipments and new orders have dropped from their wartime spiral to a level still above 1939 figures. Based upon the record of figures for the first 6 mo. of each year, 1947 shipments are 91% above the corresponding figure 8 yr. ago, while new orders are only 15% higher. Total 6 mo. shipments for this year reached $159 million while cumulative new orders totalled $116 million

Dinners and Technical Sessions Will Augment Machine Tool Show

CLEVELAND—H. W. Prentis, Jr., president, Armstrong Cork Co. and former president of the National Association of Manufacturers, will be the principal speaker at the Pre-Show Dinner on Tuesday, Sept. 16, preceding the formal opening of the Machine Tool Show at the Dodge-Chicago plant in Chicago the next day.

The Pre-Show Dinner will be the climax of Preview Day. Thousands of specially invited industrialists, government officials and journalists will inspect the hundreds of exhibits on that day.

Brooks Emeny, president, Foreign Policy Association, and consultant to the Department of State since 1943, will speak at the Overseas Dinner on Sept. 23 at the Palmer House. His subject will be "The Tools of Reconstruction." The dinner will honor foreign industrialists visiting the show. A delegation of British machine tool builders will be among those in attendance. Charles J. Stilwell, president, Warner & Swasey Co., will be toastmaster.

H. W. Prentis, Jr.

Brooks Emeny

Congress Programs Announced

The Machine Tool Congress, operating concurrently with the Show, will open its sessions with a dinner Sept. 17 at the Hotel LaSalle sponsored by the American Machine Tool Distributors' Association. Fulton Lewis, Jr., Washington news commentator, will talk on "Democracy With a Gun in Her Ribs."

Dinner tickets are available at the AMTDA offices, 505 Arch Street, Philadelphia 6, Pa.

George Habicht, Jr., association president, and president, Marshall & Huschart Machinery Co., will preside. Certificates of honorary membership will be presented to William F. McCarthy, J. Roy Porter, J. W. Wright and John Sauer, Jr.

Hobbie, Pease to Talk

K. H. Hobbie, president of the Machine Tool Congress and vice president, Driver-Harris Co., and Herbert H. Pease, president, NMTBA, and president, New Britain Machine Co. will make opening remarks.

The Production Engineering and Machine Design Divisions of the American Society of Mechanical Engineers will hold their dinner on Sept. 18 at 6:30 P.M., at the Continental Hotel. Advance dinner reservations can be made through the secretary, Machine Tool Congress, 10525 Carnegie Ave., Cleveland, up to Sept. 10, and thereafter at the Machine Tool Congress office in the Dodge-Chicago plant, 74th and Cicero Ave., Chicago.

W. G. Miller, manager headquarters manufacturing department, Westinghouse Electric Corp., will preside. J. I. Wilson of Thompson Grinder Co., will speak on "Form Grinding," and J. F. Lincoln, president, Lincoln Electric Co., will discuss "Fabricated Construction in Machine Tools."

Joint Session Arranged

The joint session of the American Society of Tool Engineers and the American Foundrymen's Association will be held Sept. 19 at 6:30 P.M., at Hotel Sherman, with F. J. Schmitt, director of sales, D. A. Stuart Oil Co., Ltd., presiding.

Speakers will be Myron S. Curtis, assistant director of engineering, Warner & Swasey Co., on "Turning Points in the Metalworking Industry," and T. E. Eagan, chief metallurgist, Cooper-Bessemer Corp., and past chairman, Gray Iron Division, AFA, on the topic "When and How to Use Cast Iron."

Several sections of the National Electrical Manufacturers Association will hold their dinner on Sept. 22 at 8:30 P.M., in the Palmer House. R. Stafford Edwards, president of the association, and president, Edwards & Co., will preside. Charles F. Kettering, research consultant, General Motors Corp., will be the chief speaker.

Habicht to Speak

On Sept. 23 at 6:30 P.M., in the Civic Opera Building, the dinner of the Chicago Technical Societies Council will be held. Dinner tickets are available at the council's offices, 53 W. Jackson Boulevard, Chicago 4, Ill., up to Sept. 20, or at the Machine Tool Congress desk in the show registration area after Sept. 17.

Dr. Gustav Egloff, council president, and research director, Universal Oil Products Co., will preside.

"Machine Tools and the Philosophy of Production," will be the theme of a talk by Mr. Habicht.

The Production Engineering Div., and Special Reserach Committee on Metal Cutting Data and Bibliography of the American Society of Mechanical Engineers will hold their dinner on Sept. 24 at 6:30 P.M., at the Continental Hotel. Reservations may be mailed to the Dodge-Chicago plant from Sept. 10, and will be available at the Congress desk after Sept. 17.

Carbide Milling is Topic

C. H. Simmons, Yarnell Waring Co., will preside. Michael Field of the Cincinnati Milling Machine Co., will speak on "Practice and Theory in Carbide Milling," and J. R. Longwell and Fred W. Lucht, both of the Carboloy Co., will discuss Developments in Carbide Application."

The final meeting, sponsored by the Society of Automotive Engineers, will be held Sept. 25 at 7:30 P.M., at the Knickerbocker Hotel. Advance reservations are being made at the NMTBA's Cleveland offices.

Stephen Johnson, Jr., SAE vice president for production activity, and assistant sales manager, Bendix Westinghouse Automotive Airbrake Co., will be toastmaster.

Speakers will be C. E. Frudden, SAE president, and consulting engineer, Allis-Chalmers Manufacturing Co., and Joseph Geschelin, Detroit editor, *Automotive Industries*.

MACHINE TOOL SHOW REGISTRATION CLARIFIED

CLEVELAND—Advance registration is not compulsory in order to attend the Machine Tool Show at the Dodge-Chicago plant Sept. 17-26. This was emphasized by Tell Berna, general manager, National Machine Tool Builders' Association, to clear up misunderstanding over advance registration.

Machinery for advance registration has been set up for one purpose—to avoid a lengthy delay for visitors at the registration desk. Those who have registered in advance will receive their official registration and admission badges several weeks before the show opens.

Those who do not register in advance must register upon arrival at the show. The registration fee is $1.

The Machine Tool Show is not for the general public, Mr. Berna pointed out. It is hoped attendance can be restricted to those who are actively identified with the field of metalworking.

Business In Tool, Die Field Good, Eaton Reports; Future Seen Bright

CLEVELAND—The volume of business being done generally by members of the National Tool & Die Manufacturers Association is good, George Eaton, Cleveland, general manager of the association, reports after an extensive trip.

A satisfactory number of orders, on which information and quotations were furnished as long ago as January, were placed in July. These orders came from scattered sources but included the automotive, farm implement, office machine, household appliance and novelty industries. However, orders from the plastic and radio manufacturing plants have fallen off in recent months.

Association Optimistic

Seasonal increases in orders from the stove companies and a general improvement in the number of sales made to the automobile producers causes no little optimism among the association's members.

But for the current steel shortage and little prospects for any betterment in the immediate future, Eaton sees the present as a time for a general upsurge in business. However, the uncertainty in the steel situation is causing many manufacturers to hold up projects which eventually will mean business for the contract tool and die group. Engineering has been completed on most of these projects and manufacturers will embark on either changing present models or branching out into other fields, once they are sure of a steady flow of materials.

Car Retooling Held Up

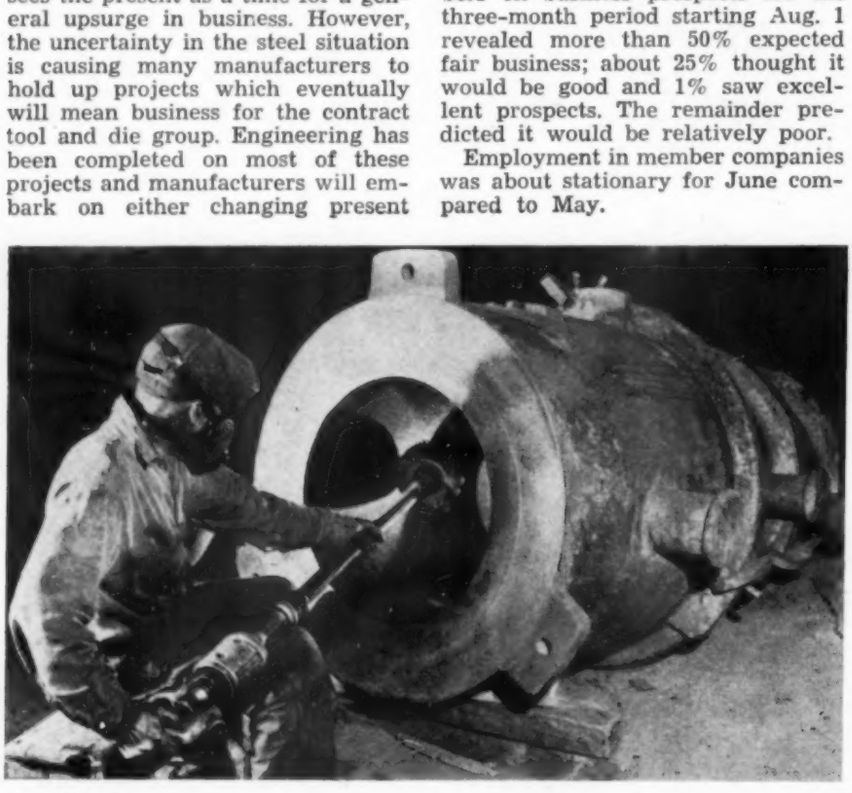
This does not apply in all cases to the auto builders, Eaton says, since many of them have not started to plumb the depths of the present market and see little reason for changing models at the present time. Preliminary work is being done by practically all of them and the association believes that once one produces a new model others will quickly fall into line.

Two hundred and one contract tool and die shops, located in 18 centers, report for June the average shop sales invoiced increased slightly over May and showed a small jump over June, 1946. June orders were off slightly from May, permitting further inroads into the backlog now estimated at two months.

Employment Stationary

A poll taken by Eaton among a sizable segment of association members on business prospects for the three-month period starting Aug. 1 revealed more than 50% expected fair business; about 25% thought it would be good and 1% saw excellent prospects. The remainder predicted it would be relatively poor.

Employment in member companies was about stationary for June compared to May.



Iron Molds are Used to produce a "chill hardened" surface on iron rolls. The inside of the mold is cleaned and sprayed with a blackening compound to protect it against the hot metal. Since only a surface hardness is required in the necks and wabblers, sand is used in the mold at these points to permit these parts to cool more slowly to produce stronger, softer metal

Freight Car Firms Doubtful of Goal

CHICAGO—Railroad car builders in this area are not too optimistic about reaching their goal of 10,000 freight cars a month starting in September.

The 5,500 cars produced in **June** set a five-year high and preliminary July figures indicate that the June total will not be reached, but an upswing in August is anticipated. In September hopes are high for a permanently higher output level.

One factor that may upset this quota is production schedules for a large number of refrigerator cars on old orders. Materials have been gathered and assembly is ready to start, but such cars require about twice the man-hours of a standard boxcar.

Other Shortages Felt

Complaints about lack of steel are diminishing but other shortages plague the builders. The job of gathering complete "sets" of components for cars remains difficult and at times output will be halted because 5% of the parts are missing. Builders also report that the flow of steel has not been uniform and that steel plates and structurals are still lacking.

Greater standardization has helped to boost output by Pullman-Standard. Production in Michigan City, Ind., plant is up 25% as a result of this, and the new method is to be installed at a Bessemer, Ala., track. Other Pullman plants, however, will continue to turn out custom-built cars. Pullman officials say the outlook is "very fair."

Exports to Drop

General American Transportation Co. also expects to step up production, but GATC is switching to greater output of refrigerator cars. American Car & Foundry's car output was less in July than in June, and operations at St. Louis were affected by floods. Pressed Steel Car Co. also does not expect to reach June output levels in July.

The large number of cars exported has not helped ease the rail car shortage in the domestic field. In the first six months of this year there were 26,569 cars exported, against 21,737 made for home use. Actually, however, the foreign cars were equivalent to only 13,000 American cars since they use only half as much material. Most of the exported cars have gone to France. Foreign orders still on the books amount to only about 7,000 cars so export competition will not be an important factor in the second half of 1947.

Detroit

BUICK ORDERS MACHINE TOOLS FOR AUTOMATIC TRANSMISSIONS... TOOLING EASES IN DETROIT SHOPS... STRIKES BESET SOME PLANTS

Buick Launches '48 Program

After being in the talk stage ever since the end of the war, ordering has finally begun for machine tools to manufacture new automatic transmissions. Buick is the buyer.

Some sources believe that in spite of these orders Buick may not have yet finally made up its mind. The equipment being specified thus far could be used on the standard transmission manufacturing lines of the second largest GM division. However, the signs are overwhelmingly in favor of Buick's definitely coming out with a new automatic development on its 1948 models—a cousin, perhaps, to the Hydra-Matic used on Olds and Cadillac, but hardly more closely related than that.

Indications are that Buick may spend as much as $3 million on this program. Tooling costs will go beyond that outlay.

Other companies, meanwhile, are working vigorously on their automatic transmission projects, but are not yet distributing orders. In the "on the verge" category is Ford, whose negotiations with the Detroit Gear Division of Borg-Warner have warmed up again. Various independent companies also seem to be about ready. The indication is fairly definite that as soon as one modestly priced or popularly priced car makes the move toward an optional automatic transmission, all the others will do likewise. They are mostly ready for any contingency.

Forging Dies Loosen

All classes of tooling, meanwhile, have become easier to obtain in the Detroit shops. Survey indicates that the most pronounced loosening is in forging dies; they may be had today in an average of about six weeks' time, as contrasted with almost eight weeks in April. Sheet metal dies are still available inside of five weeks. The rise in die ordering first seen in June evidently has not yet gathered real momentum. Jigs and fixtures, the survey shows, can be had in Detroit shops in an average of 4.3 weeks, against 4.5 during April.

Increased Tooling Demand

Indications are pointing to an enlargement of demand for tooling in the near term ahead. Companies are finally getting going on the make-ready operations and work for their 1948 models.

To date this work is all being done in the development and engineering departments of the various manufacturers. Indicative is the recent increase in advertisements for full size body layout men, auto body designers, die tryout men, and others of similar categories.

Among the advertisers, incidentally, is Kaiser-Frazer Corp. This would indicate that the Willow Run manufacturer is moving according to earlier plans, to offer a model or two in addition to the 4-door, 6-passenger sedan which has been its sole production type up to now.

Third Quarter Outlook

Car production has been racked by one difficulty and then another in recent weeks. All Michigan car divisions of General Motors closed down for a week in mid-July to accumulate steel which had dwindled to the vanishing point.

The GM reopening was accompanied by a shutdown of the Mercury and Lincoln divisions of Ford Motor Co., resulting from a strike at Murray Corp. The strike occurred when the CIO United Auto Workers demanded a clause in its new contract exempting the union from liability under the Taft-Hartley Act. If the Murray strike continued for any length of time it would likely affect Dodge, to which it furnishes frames; and possibly some GM divisions, to which it furnishes seat cushions.

Without reference to the dislocations which may grow out of the Murray strike, but considering in its entirety the short steel supply, the automobile production outlook for this quarter is not too bad. Expectations of the car and truck makers point to a third quarter output somewhere in the neighborhood of 1,500,000 vehicles, as contrasted with a total modestly above 1,300,000 in the same period last year.

If further strikes break out among key suppliers over the demand of the auto union for protection against Taft-Hartley suits, this production outlook may be materially reduced.

Auto parts makers, meanwhile, expect a continued high volume of shipments this quarter to replacement outlets as well as original equipment buyers. Their plans are for an advance of 20% or more over the third 1946 quarter.

Trend to Bigger Generators

One out-of-sight change for several 1948 models—and a change which probably will become more universal for 1949—will be larger, higher capacity generators. Lincoln has already installed an improved type.

The reason for this shift is the long-range program of all producers to have electricity do more work than it has before. Its versatility was first demonstrated when convertible tops began to be moved electrically. Current plans call for front seat adjustment in forthcoming models to be accomplished the same way.

Amplifying Production in the Buick plant at Flint, Mich., is this recently installed Greenlee transfer machine for drilling and tapping 89 holes in the cylinder crankcase. The unit comprises ten stations, and functions completely automatically

Unions Need Managements' Help To Carry Out Boycott of NLRB

WASHINGTON—To what extent can unions "boycott" the National Labor Relations Board?

What is the significance of the "able and willing to work" clause John L. Lewis got for his United Mine Workers in both soft and hard coal contracts?

Management, since the passage of the Taft-Hartley labor law, has sought in vain answers to these and other questions. Neither those who wrote nor those who will administer the law have clearly defined all of its potential intricacies.

Coal Operators Aided CIO

However, it is obvious that unions can avoid the NLRB if management cooperates. If concerns—as the coal operators did—pledge to live within the collective bargaining agreement without recourse either to the courts or the NLRB, then management will lose rights obtained under the new law.

In effect the CIO unions say they want to operate in pre-Wagner act fashion. In this attempt the strong may succeed but not the weak.

The reported intentions of CIO leaders to boycott the NLRB will be exceptionally difficult if they are named defendants before the board on management charges, one official pointed out.

The unions want to eliminate from their contracts any no-strike clause so that they might not be held responsible for any strikes, whether wildcat or sanctioned. A provision that the contract terms will apply only when the workers are "willing and able to work" is intended to take care of that.

A catch in all this planning, however, is the fact that while union and employer may cooperate to avoid NLRB, they can't ditch the Taft-Hartley labor law's other provisions such as the bans on closed shop, boycotts and jurisdictional strikes. Also the curbs on welfare funds, checkoff and political contributions.

Third Parties Protected

The new law also gives rights to individuals and third parties who may be aggrieved by the action of a union and/or an employer to sue for damages. There are also criminal penalties for violation of the law. These are the uncertainties which caused most unions to warn their local leaders to step carefully. They may try to avoid the law, but they dare not violate it.

Only after the law has been in operation, and situations requiring decisions from NLRB arise, will the import of many provisions of the law and devices of unions to avoid or circumvent them begin to have meaning. Even then, NLRB will rely on the joint Senate-House committee, headed by Sen. Joseph H. Ball, for some guidance.

Business Techniques are used by the International Associations of Machinists in analyzing nearly 9,000 bargaining contracts its affiliates have with management. Donna Lee Kuhn is shown with a McBee sorter which enables the union to get quick answers to what contracts contain. If the union wants to know which contracts contain provisions for a health and welfare fund, a long needle is inserted in a certain hole through a stack of cards. Those containing the sought information can be lifted out for examination

Steel Fabricators' Group At Capital For Fall Probe

WASHINGTON—Investigation of the industrywide bargaining practices in the steel industry is on the fall agenda of the Ball Joint Congressional Committee set up under the Taft-Hartley labor law.

Steel fabricators and other employers, pressed by the CIO United Steel Workers of America to pay the same increase granted by U. S. Steel, will get a chance to air their problems.

The Non-Basic Steel Coordinating Committee, expecting to submit evidence to the committee, has moved from Detroit to Washington.

Job Shifting Dips As Layoffs Jump

WASHINGTON — Significant increases in May layoffs in the iron and steel group, electrical machinery, other machinery and radio equipment industries is reported by the U. S. Bureau of Labor Statistics.

In basic iron and steel, however, hiring rose.

Some plants attributed layoffs to material shortages, others to declines in new orders. Steel and parts shortages boosted the layoff rate in automobiles. In aircraft manufacturing and shipbulidng the rate of forced reductions rose substantially, reflecting, BLS said, contract completions and production curtailments.

In manufacturing as a whole, the hiring rate fell from 51 to 47 per 1,000 employed, the lowest May rate since 1940. The layoff rate, on the other hand, went up from 10 to 15 per 1,000 employed.

Narrowing of job opportunities reduced voluntary job shifting to only 34 per 1,000 employed, compared with 37 during April.

IAM Merger Again Confronts AFL at Fall Council Meeting

WASHINGTON—The International Association of Machinists has thrown back into the lap of the AFL Executive Council the question of reaffiliating with the AFL. The council meets Sept. 8 in Chicago.

For the second time an IAM referendum of 630,000 members calls for withholding per capita payments to the AFL.

The IAM renewed its charges on rulings and demands on ship work.

Military To Name Required Surplus

WASHINGTON—The Army and Navy plan to put strings on some 77 surplus industrial plants and about 92,000 machine tools in the interest of national defense.

This action comes under the powers granted by the interim legislation Congress passed just before adjournment to prevent War Assets Administration from selling or junking existing surplus plants and machinery.

The Nelson plan (HR 3670) will come up again for further study next year in Congress as a long-range program for an industrial reserve of standby plants and equipment.

Stop-gap Legislation

Without setting up any formal industrial reserve the stop-gap legislation authorizes the services to:

1. Take over from RFC, DPC or WAA any plants or machinery which would be of use in the event of a future war.

2. Rent out, on leases of five years or more, any plants or equipment for which they have no present need. This gets the Army out from under the burden of maintaining such material, since maintenance and servicing by the lessee may be counted as part or all of the rent.

3. Impose conditions, when declaring industrial material surplus, on WAA disposal for insuring availability for future military use. To protect WAA, it is specified that, if disposal proves impossible subject to the conditions imposed, the military must either modify the conditions or take back the property from WAA and dispose of it.

LEVEL OF EQUIPMENT BUYING EXPECTED TO REMAIN HIGH

WASHINGTON—The President's Council of Economic Advisors expects business investment in new plant and equipment to continue at its present high levels at least through the end of the year.

In their mid-year report, the White House economists say "the backlog of needs, particularly for replacement and modernization of equipment, is far from exhausted."

During the first half of 1947, the report states, business expenditures on producers durable goods was running at an annual rate of $17 billion—as compared with a rate of $15.7 billion during the last quarter of 1946.

Level of investment, coupled with better than a $12 billion a year excess of exports over imports, leads the council to minimize likelihood of a recession in the near future. Six months ago the council intimated some reduction of economic activity in late 1947.

Firms Dealing With Military Must Await Buying Procedure

WASHINGTON—Still months away is the time when manufacturers dealing with the armed services can have any clear idea of just where and how they will deal on a long-term peacetime basis.

Military procurement legislation, designed to spell out peacetime contracting procedures based on wartime experience, got jammed up in Congress' rush to adjourn and failed of passage. It'll come up again next January.

Production Aided By Shorter Hours

WASHINGTON—Shorter working hours have increased efficiency and reduced absenteeism and injuries in general, the U. S. Bureau of Labor Statistics reports.

This conclusion was reached after a study of 34 plants to determine the effects of the 8-hour day and 5-day week. Manufacturers of motors, shell, castings forgings and machinery were examined. The survey also covered some automatic screw machine operations but steel and automobile production or mining were not touched.

No effort was made to study the effect of a work day of less than eight hours or a work week of less than 40 hours.

The reverse trend was indicated on automatic machines, such as screw machines, because non-productive time was spread over a longer period.

Some Highlights

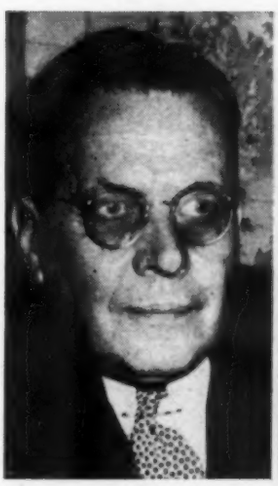
- Efficiency dropped more and the injury rate went higher when the work day was lengthened than when the extra hours were included in a sixth working day. A sixth day increased absenteeism.
- Workers under wage incentives and at routine and repetitive jobs obtained only two hr. of output for every three hr. worked beyond 48 hr.
- In a large forge shop output was no better during a 58-hr. week than it had been during an earlier week of five 10-hr. days.
- In a plant producing shells, output during a 60 to 66-hr. week was only slightly more than it was at 40 hrs. The same output could have been made in 44 or 55 hrs.

Truman's Interim NLRB Appointees Seen on "Trial"

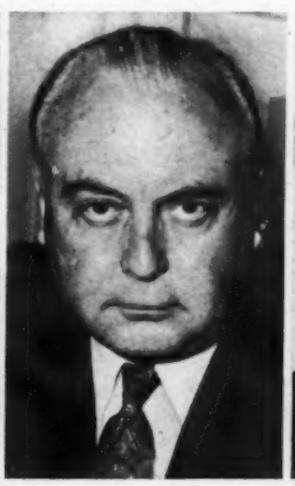
WASHINGTON—In failing to act on President Truman's nominees to vital National Labor Relations Board positions, the Senate in effect is buying insurance. By delaying its confirmation until January, the Senate has put the new officials under strong pressure to administer the new Taft-Hartley labor law in accordance with the wishes of Congress.

Thus, for the next five months when important procedural and policy decisions must be made, the interim appointees—NLRB members Abe Murdock and J. Copeland Gray, and General Counsel Robert N. Denham—will be "on trial."

From the management viewpoint, this may be a "break." As a Senator from Utah, Murdock was considered a die-hard New Dealer.



Robert N. Denham

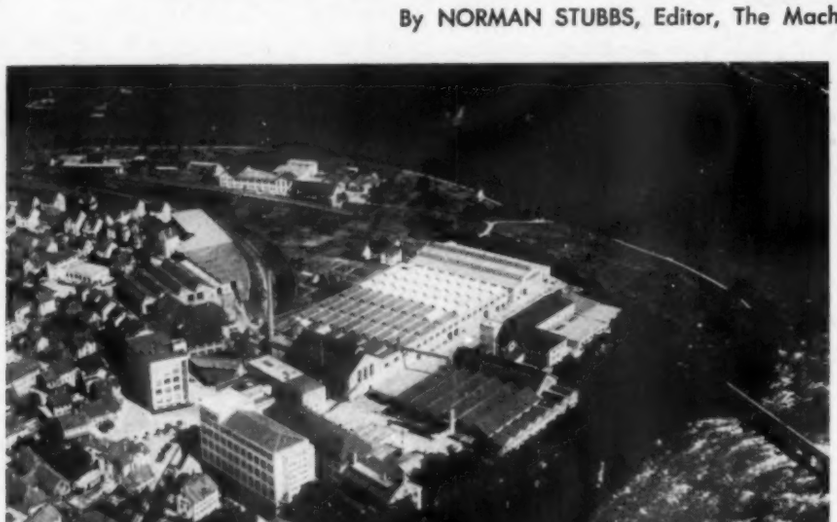


Abe Murdock

J. Copeland Gray

Swiss Machine Tool Industry Expands for Export Trade

By NORMAN STUBBS, Editor, The Machinist, London



Diversified Products are turned out in this large, modern factory, which is situated above the Rhine Falls in Switzerland. The company produces machine tools, railway coaches and packaging machinery in separate shops. Of the 45 Swiss companies making metal- and wood-working machine tools, only about 28 are engaged exclusively in such production

ZURICH, SWITZERLAND — Reaching new production and development heights during the war, Switzerland's machine tool industry looms as a strong competitor in European markets in years ahead.

Originality in design has marked Swiss machine tools in years past. The country's high-precision machines have won enviable reputation and are familiar to industrialists in the U.S.A., and throughout Europe.

A survey indicates Swiss metalworking plants have kept pace with the machine tool industry's strides. There is a preponderance of newer Swiss machine tools in evidence, but the plants also have British, U. S., German, Czechoslovak and Italian machines.

Self-sufficiency in Machinery

The machine tool industry is producing more varied types of equipment than ever before. The Swiss have moved close to self-sufficiency in various types and classes of machinery. Inability to import needed equipment during the war is accountable.

There are now 45 plants producing machine tools, with 28 manufacturing no other products. In 1938, a total of 21 companies were engaged in machine tool manufacturing exclusively.

Machine tool and metalworking firms are precluded from full capacity operations by shortages of both manpower and materials. Manpower is inadequate throughout all industries, but particularly acute in those industries requiring skilled workmen.

Imports on Materials Difficult

Shortage of materials has been a major obstacle. The Swiss are almost entirely dependent on imports for their raw materials. Some exchange arrangements have been worked out, but metalworking officials are hopeful supply lines will ease to meet plans for expanded operations.

Another medium hampering operations involves government control over prices of capital equipment for home sales. Designed ostensibly to stimulate export sales, the regulation affords stumbling blocks.

Prices of equipment for export are not controlled. As a result, equipment often finds itself in export channels when domestic users need the material. For example, ball bearings are often shipped out of the country while Swiss machine tool manufacturers lack them to complete machines already ordered.

Bearing Shortage Acute

The bearing shortage became acute when Sweden, a key supplier, halted exports to Switzerland upon signing the Russo-Swedish trade agreement. Coal is short, although better supplies are now being obtained from Poland and on somewhat of a barter basis. Iron castings and electric motors are likewise causing disturbing bottlenecks.

The Swiss face many difficulties in their export-import business. Some stem from the high standing of their credit and "hardness" of their currency. Others arise from artificial obstacles to trade.

The Swiss Government controls exports by license. While this sets up some difficulties, it hasn't had serious effect on export business. Demand for Swiss capital equipment is still running at a high level, and machine tool makers report a heavy volume of orders on export books.

Trade Activity Increases

Trade in machine tools with Britain in both directions is increasing. Prospects are good in the Balkans, France, and Spain. This business is partly financed by Swiss credits and bilateral trade agreements.

South America is interesting to the Swiss as a good market for textile machinery, electrical machinery and diesel engines, but to a less extent for machine tools. Argentine and Brazil provide most customers for machine tools in that quarter.

British India and Egypt offer good possibilities, but difficulty arises over necessary import licenses.

Exports to the United States are more than 2½ times greater now than in 1938. Imports from the U. S., however, have almost trebled. Exports of machine tools to France have risen in value more than six times since 1938.

Exports 65% of Output

Exports of machine tools, on the average, are running at present at 60 to 65% of output, although a number of firms are shipping 90% or more of their machines to other countries.

An example of problems besetting export trade is that involving Spain. Difficulty is that the Swiss are finding it so expensive to buy from Spain, because of the exchange rate, that they have had to introduce a scheme whereby the Swiss importer is granted a premium against authorized purchases made in Spain.

Money to meet this premium is raised by adding a percentage to the price of goods exported to Spain. This, supposedly, makes the exchange rate "more realistic."

The distortion in the machinery of world trade is seen again in the goods

piled up in Swiss factories, ready for export, but held up for papers and authorities of one kind or another.

The labor force in the machine tool industry is now understood to be at its peak, being 100% greater than in 1935, and 33 1/3% up on 1938.

There is keen competition between different branches of the metalworking industries for available labor. This has led to wasteful labor turnover and continuous rise in wages

One large engineering firm now employing about 2,000, with a considerable proportion on machine tool work, engaged 800 new workers over a period, only to lose 640 during the same period. Another metalworking firm with about the same total labor force, a proportion of them building machine tools and other types of industrial machinery, needs 300 more workers, but has little prospect of getting them.

Watch and clock making firms seem to be attracting labor from other branches of the industry because of higher wages.

Plant Layout in this Swiss factory is adapted to construction considérations. Engaged in production of Swiss-type automatics, this plant is characteristic of a number of Swiss machine tool and engineering works. The heavier machines are on the ground floor, with light machining and assembly devoted to galleries

Italian Workers Imported

Labor shortage has led to importing Italian workers on a considerable scale. Industries hiring Italians report excellent results.

Apprenticeship programs have been stimulated. Well-organized training programs are in operation at the majority of factories. Managements are taking particular pride and interest in these plans which, in general, provide a four-year course with technical training, a period in the apprentice workshop, and some time in the shops.

Increase in the range of machine tools and equipment manufactured in Switzerland is remarkable for such a comparatively small industry. The average metalworking shop could be equipped today almost completely with Swiss machines, except for the very largest units. During the war, quite heavy planers, lathes and similar items were produced.

Heavier Machines Available

A large horizontal boring and milling machine was added recently to one firm's program. Some of the heavier machines are now available as standard products, but others were made to special order during the war emergency. In general, it seems unlikely that Swiss makers will attempt to extend activities in this direction.

The most striking features of current types are the finish, degree of accuracy claimed, and ingenuity in design. Quantity production machines include two makes of lathe, and milling machines, specially designed for hard metal tools.

One or two firms are also building small machines of simple type which are well adapted for use in quantity production when provided with suitable fixtures. In a sense, they come between machines specially built for the job and general-purpose types.

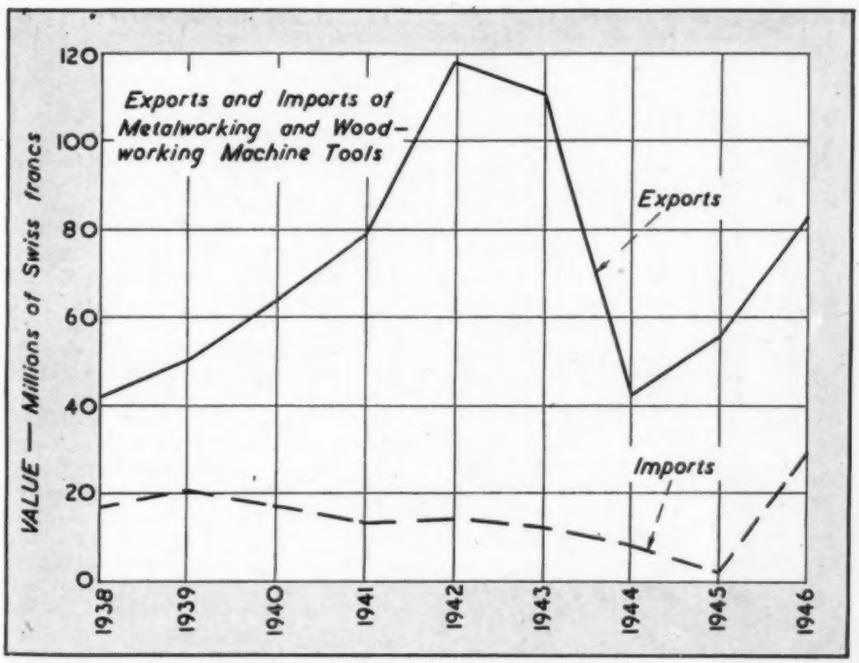
Grinding Machines Predominate

Grinding machines seem to predominate in Swiss makers' lists today. They are made in a wide range of types and sizes, and there is keen competition in this field, in which there has been much development.

Cutter grinding machines introduced by a number of firms, in particular, are notable for original design features. The well-known Swiss gear-grinding machines have been the subject of further improvements.

Other recent introductions now in production include new milling machines, lathes, a spiral-bevel gear generator, and horizontal boring machines.

Swiss manufacturers generally have always worked on the basis their "line of country," at least so far as exports are concerned, must be quality goods of advanced design. They will undoubtedly continue to follow this line in their machine tool industry during the years ahead.



Exports and Imports for the period 1938 through 1946 are charted here in millions of Swiss francs. The American exchange rate is .2340 cents

Non-ferrous Metal Markets Here Fearful of Orient's Political Unrest

WASHINGTON — Labor problems, both here and abroad, and an unsettled and potentially dangerous political situation in the Orient are combining to cause concern in the U. S. non-ferrous metal markets.

The copper market, which had been showing signs of a return to normalcy and indications of a possible easement in prices, has lost ground because of a strike threat against American Smelting and Refining Co., Phelps Dodge Corp., and Kennecott Copper Co., three of the largest copper producers and refiners.

Because of the indeterminate status of the threatened strike, sellers of the metal have become cautious of any large commitments.

The union, the Mine, Mill and Smelter Workers (CIO), has asked for higher wages, maintenance of membership, voluntary checkoff of dues, elimination of "no-strike" clauses in the present two-year contract, and protection from liability under the new Taft-Hartley act.

Continuance of Plan Helps

Last minutes Congressional sanction of continuation of the Premium Price Plan for copper, lead, and zinc — and now manganese — has eased the fears of lead and zinc sellers over rising costs and a shortage of these metals.

During July, when the plan was not functioning because Congress had not continued it beyond the July 1 termination date of last year's law, thousands of lead, zinc and copper mines in the West and Midwest were forced to close.

High operating costs for these marginal mines prevented non-subsidized operations. Tri-State Mines alone produce about 5,000 tons of zinc a week.

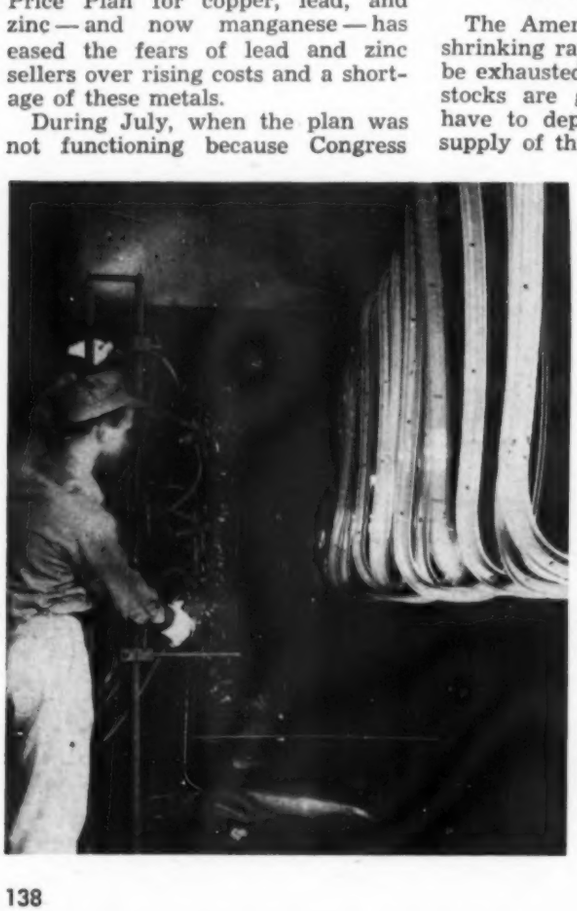
Steady Demand for Lead

Demand for lead remains steady and there are no indications of price changes in the near future. Zinc production fell off sharply in July because of the delay in continuing the Premium Price Plan. Trading in zinc, however, remains slow and there are no price changes seen for the near future.

The political situation in the Dutch East Indies and in Malaya, source of the cheapest and best tin in the world, appears developing into an international squabble that might curb the already critically low tin production. Any further reduction in tin output in the Orient would leave the U. S. out of the metal entirely in a matter of months.

Tin Stockpile Shrinking

The American stockpile of tin is shrinking rapidly and will probably be exhausted early next year. When stocks are gone, the country will have to depend on hand-to-mouth supply of the metal.



Spray Finishing— Automatic electrostatic spray finishing on automobile garnish moulding in the Ransburg process produces an even film thickness, edges and contours fully convered, and considerable saving in paint. With the moulding shown here, three fixed guns are used. On others, only one or two guns are used to introduce atomized paint into the electrostatic field. On this type of moulding, the contours and openings preclude dipping from both a production and quality standpoint

Lewis' Real Gains Evaluated At More Than 15-Cent Pattern

WASHINGTON—Metalworking executives are pondering the real effect of John L. Lewis' coal settlement agreement on their operations. Few go along with claims the miners received only a "pattern" increase of 15 cents an hr.

Lewis asserts his miners realized an increased "increment" of $3.54 a day, or 44 cents an hr., in the new soft coal contract. Coal operators, supported by Truman's Economic Advisory Council, maintain the hourly increase is 15 cents.

Most of the evidence seems to favor Lewis' claim. True, the miner will receive only $1.20 more each day ($13.05 instead of $11.85), which comes to 15 cents an hr. for eight hr. But he works one hour less, his portal-to-portal day being eight instead of nine hr. He gets 15 minutes more paid lunch time, and 10 cents (instead of 5 cents) a ton royalty contribution goes into the welfare fund.

The hourly rate, previously $1.18½, is now slightly more than $1.63.

In steel, automobile, electrical and other industries, total benefits come to 15 cents an hr. The hourly rate increase was 11½ cents.

Lewis' accomplishment with the coal operators has brought grumblings from other unions. Those close to the situation are convinced other unions will make every effort to match the coal miners' gains.

ASME Honors to be Accorded At Annual Meeting, Dec. 1-5

NEW YORK—Medals and prizes for outstanding achievement will be awarded members of the American Society of Mechanical Engineers at the 68th annual meeting at Atlantic City, N. J., Dec. 1-5.

The ASME Medal, highest honor of the society, will be awarded to Paul W. Kiefer, chief engineer, motive power and rolling stock, New York Central Railroad. Raymond D. Johnson, hydraulic engineer, retired, of Fort Lauderdale, Fla., will receive the Holley Medal.

The Worcester Reed Warner Medal will be presented to Arpad L. Nadai, consulting engineer, Westinghouse Research Laboratories, E. Pittsburgh, Pa. Raymond C. Martinelli of the general engineering and construction laboratory, General Electric Co., Schenectady, will receive the Melville Prize Medal for an original paper on "Heat Transfer to Molten Metals."

Secretary of State George C. Marshall will be honored.

Middle Atlantic Firms Lead In Scheduled Expansion Plans

NEW YORK—Highlighting many recently announced construction and expansion plans of firms throughout the country is Jones & Laughlin Steel Corporation's $100 million improvement program, scheduled to cover a three-year period. A $1 million warehouse for cold-finished bars at the Hazelwood division of the Pittsburgh Works and an $800,000 iron ore mine at Wakefield, Mich., as well as a new open hearth plant are high on the list of projects.

The Middle Atlantic states are leading the country in large expansion programs. Westinghouse Electric Corporation's $25 million plant in Buffalo is one of the most important, while the Carborundum Co. has started an extensive building program in Niagara Falls on which over $15 million will be expended. In Pennsylvania, SKF will spend over $4 million in the expansion of its two Philadelphia plants, with most of the money being spent for new equipment, and Allis-Chalmers Mfg. Co. has announced a several million dollar program for its Pittsburgh works.

Other programs throughout the U. S. recently announced include:

California

STOCKTON—Hickenbotham Bros., Ltd. has purchased the wartime plant of the National Cylinder Gas Co. for $57,500 from WAA. Plant will be used for production of welding rods.

The Linde Air Products Co., unit of Union Carbide & Carbon Corp., is building an oxygen filling station and acetylene-producing plant.

Connecticut

WILLIMANTIC—American Screw Co. has acquired the former Pratt & Whitney Aircraft Div. and will install new equipment.

Illinois

DANVILLE—General Motors Corp. will build a new malleable iron foundry doubling the size of the present plant and employing 600 additional workers.

DOLTON—United States Steel Products Co. will enlarge and modernize its plant by the addition of four new buildings to house improved office and employee facilities and provide additional warehouse space.

Indiana

SOUTH BEND—Bendix Aviation Corp. has purchased the parts of the aircraft testing plant it operated during the war from WAA for $80,000.

Massachusetts

NORWOOD — Tobe Deutschmann Corp. has purchased the marine electrical equipment plant operated during the war by Bendix Aviation Corp., from WAA for $644,445. Over 500 more workers will be employed.

Names in the News

B. E. Schroeder

J. W. Kinnear, Jr.

B. E. Schroeder, wartime general superintendent of the aviation motor plant of Buick Motor Co., has been elected vice president of manufacturing of Hotpoint, Inc. **Patrick W. Ryan** has been promoted to general superintendent, and **M. E. Maurer** has been named general manufacturing engineer.

James W. Kinnear, Jr. has been appointed executive vice president of Firth Sterling Steel and Carbide Corp., McKeesport, Pa. A director of Firth Sterling since 1932, Mr. Kinnear has been associated with Carnegie-Illinois Steel Co. and its predecessor since 1923. Until recently he was assistant manager of operations of the Pittsburgh district for Carnegie-Illinois.

Courtney Johnson, assistant to the chairman of the board of The Studebaker Corp., South Bend, Ind., has also been named assistant to the president.

Hickman Price, Jr., has been appointed executive vice president of Kaiser-Frazer Export Co. Also a member of the board, he has been with the firm since its formation.

Joseph F. Chalupa has been appointed manager of design engineering of the Westinghouse Aviation Gas Turbine Div., Lester, Pa. He will be responsible for the production design of the company's aircraft jet propulsion engines.

John A. Williamson, general superintendent of the coated abrasives division of the Carborundum Co., Niagara Falls, N. Y., will go to the Carborundum Co., Ltd., Manchester, England as managing director about Oct. 1. He succeeds **Frank W. Higgins,** who will retire.

Allan B. Kime has joined the Ransome Machinery Co., Dunellen, N. J., as eastern regional manager in charge of the sale of positioning and turning roll equipment.

Thomas B. Moule, assistant director of sales for the Plomb Tool Co., Los Angeles for the last three years, has been placed in charge of Plomb's eastern sales organization, with temporary headquarters in the firm's Chicago sales office. **Jack G. Allen** has joined Plomb to succeed Mr. Moule and to supervise the Export Department.

Mrs. Thomas S. Hemenway has been elected chairman of the board, president and treasurer of the Metal & Alloy Specialties Co., Inc., Buffalo, N. Y., succeeding her late husband. **Richard A. Stockton** has been named general manager.

R. M. Paxton, Jr.

A. R. Kelso

Richard M. Paxton, Jr., who has been in charge of the New York office of Jessop Steel Co. for the last 20 years, has been elected a vice president.

A. R. Kelso has been appointed executive vice president of the Warren City Manufacturing Co. and the Warren Stamping Co., Warren, Ohio.

BUSINESS ITEMS

The E. L. Essley Machinery Co. has moved its offices to 565 Washington Blvd., Chicago 6.

Fansteel Metallurgical Corp., North Chicago, has acquired all the outstanding stock of the **Weiger-Weed Co.,** Detroit, welding equipment manufacturers. Weiger-Weed will continue its operations in Detroit as a division of Fansteel. **Henry D. Weed** will be in charge of sales, while factory production and engineering will be under the direction of **Ernest Huebner. Joseph A. Weiger** is general sales manager of Fansteel with headquarters in North Chicago.

Federal Products Corp., Providence R. I., has moved its Detroit office into its own building at 17181 Schaefer Highway, Detroit 21.

The Orillia Body & Machine Works, Renton, Wash., has moved its operation into a portion of the former Boeing Aircraft Co. plant at Renton under an interim permit from WAA.

American Welding & Manufacturing Co., Warren, Ohio, has transferred its eastern district offices to The Industrial Bldg., 1060 Broad St., Newark 2, N. J. **Frank J. Shanaberg** has recently been named eastern district sales manager.

Brooks & Perkins, a former partnership, has been incorporated as fabricators of magnesium parts and products at 1957 W. Lafayette, Detroit. Officers include: **E. Howard Perkins,** president; **Oliver N. Brooks** and **Paul A. Day,** vice presidents; **Clifford W. Sponsel,** vice president in charge of fabrication; and **Charles I. Vogel,** sales manager.

The Whitney Chain & Mfg. Co. has moved its branch office and warehouse to larger quarters at 2914 Taylor St., Dallas 1.

Vascoloy-Ramet Corp., North Chicago has appointed **Frank H. Scheffler** to head its new office at 7041½ Harrisburg Blvd., Houston, covering the southwest area, while **Dean R. Cline** heads the new office at 315 Union Arcade Bldg., Davenport, Iowa, serving Tri-Cities and southern Iowa. **Tool Engineering Service,** 505 No. 22 St., Birmingham, Ala., has been appointed manufacturers' agent for the southern industrial area.

Farrel-Birmingham Co., Inc., Ansonia, Conn., has completed arrangements with **John Bertram & Sons Co., Ltd.,** Dundas, Ont., Canada whereby processing equipment for the manufacture of rubber and plastics, phonograph record machinery, rolling mill machinery and hydraulic machinery will be built in Canada, and distributed through Bertram's offices in Dundas, Vancouver, Winnipeg, Windsor, Toronto and Montreal.

OBITUARIES

Crawford Neal Kirkpatrick, board chairman of the Landis Machine Co., Waynesboro, Pa., died July 28 after a long illness. After graduating from Dickinson College in 1913, he went to work in the sales department of Landis. He rose to sales manager, secretary, general manager, vice president, president, and finally to board chairmanship. He was also secretary of the Canadian Landis Machine Co., Ltd.

Mr. Kirkpatrick served as a director and treasurer of the National Machine Tool Builders Association. He was also a member of the National Metal Trades Association, National Industrial Conference Board, Army Ordnance Association, National Association of Manufacturers, American Petroleum Institute, and Pennsylvania Society of New York. He was on the War Production Board committee during the war.

J. Carroll Kennedy, vice president of The Kennedy Valve Co., Elmira, N. Y., died June 23. Son of the firm's founder, he had been vice president in charge of manufacturing for 20 years.

Walter Fugh, secretary-treasurer of the Simonds Gear & Manufacturing Co., Pittsburgh, died suddenly July 28. He had been associated with Simonds for 50 years.

Arthur J. M. Edwards, 75, retired sales manager of the New York office of the lamp division of Westinghouse Electric Co., passed away July 29.

William D. Caton, 52, vice president of the Standard Register Co., Dayton, Ohio, succumbed July 21.

Albert H. Humes, treasurer and one of the founders of the Standard Nut & Bolt Co., Valley Falls, R. I., passed away July 29.

Wilson A. Fenn, 65, president, treasurer and director of the Fenn Manufacturing Co., Hartford, Conn., died July 18. Co-founder of the company, along with his father, in 1915, he has served as president since his father's death in 1921.

Raymond R. Ridgway, 50, assistant director of research for the Norton Co., at Niagara Falls, N. Y., succumbed June 12. Among the many inventions and improvements credited to him were the discovery and commercial production of Norbide and the invention of the abrasive 32 Alundum.

William J. Knapp, 63, retired vice president of the Union Carbide & Carbon Corp., died July 19.

Ralph M. Vincent, 41, vice president of the Hercules Campbell Body Co., Inc., auto body makers of Tarrytown, N. Y., succumbed July 27.

Calvin B. Humphrey, 81, passed away July 27. He was formerly with Westinghouse Manufacturing Co., Pittsburgh, and later served as sales manager of the diesel engineering division of the Worthington Pump & Cachines Corp., Harrison, N J., until his retirement in 1929.

Frederick F. Rose, 72, who retired as assistant vice president of the American Car & Foundry Co. two years ago, died July 26. He had been associated with ACF for 46 years.

Harry N. Syster, 55, supervisor of mill sales for the last 10 years of Latrobe Electric Steel Co., Latrobe, Pa., passed away July 21. He had been associated with Latrobe over 30 years and was formerly purchasing agent.

MEETINGS

American Gear Manufacturers Association. Fall meeting. Edgewater Beach Hotel, Chicago. Oct. 27-29. Newbold C. Goin, executive secretary, Empire Bldg., Pittsburgh 22.

American Society for Metals. National Metal Congress & Exposition. International Amphitheatre, Chicago. Oct. 18-24. Graves Taylor, 7301 Euclid Ave., Cleveland 3.

American Society of Mechanical Engineers. Fall meeting. Hotel Utah, Salt Lake City, Utah. Sept. 1-4. Ernest Hartford, executive assistant secretary, 29 W. 39 St., New York.

American Welding Society. Annual meeting. Hotel Sherman, Chicago. Oct. 19-24. M. M. Kelly, secretary, 33 W. 39 St., New York.

Instrument Society of America. Annual conference and exhibit. Hotel Stevens, Chicago. Sept. 8-12. National office, 1117 Wolfendale St., Pittsburgh.

Machine Tool Congress. Evening meetings in conjunction with the 1947 Machine Tool Show of the National Machine Tool Builders' Association:

American Foundrymen's Association. Sept. 19.

American Machine Tool Distributors Association. Hotel LaSalle. Sept. 17.

American Society of Mechanical Engineers. Hotel Continental. Sept. 18 and 24.

American Society of Tool Engineers. Sept. 19.

Chicago Technical Societies Council. Sept. 23.

National Electrical Manufacturers Association. Palmer House. Sept. 22.

Society of Automotive Engineers. Hotel Knickerbocker. Sept. 25.

National Machine Tool Builders Association. Machine Tool Show. Dodge-Chicago plant, Chicago. Sept. 17-26. Tell Berna, general manager, 10525 Carnegie Ave., Cleveland.

Society of Automotive Engineers. Tractor meeting. Hotel Schroeder, Milwaukee. Sept. 17-18. John A. C. Warner, executive secretary and general manager, 29 W. 39 St., New York 18.

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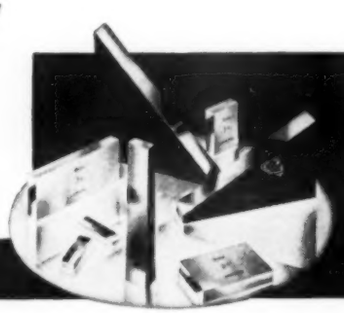

Webber
PRECISION
GAGE BLOCKS

Rail Steel Products—I

RAIL STEEL (standard hot-rolled bars, bands and shapes re-rolled from standard T-section railroad rails) provides a source for quality carbon steel that is 50% stronger than medium-carbon steel and possesses sufficient ductility for punching, shearing and moderate forming operations. Total capacity of rail-steel mills in the United States and Canada is approximately 600,000 net tons per year.

Fabricating economy is offered by rail steel, in that lighter sections and gages can be used and still maintain the desired strength. Minimum tensile strength is 80,000 psi., minimum yield point, 50,000 psi., according to Section 27 of the Steel Products Manual issued by the American Iron & Steel Institute.

Products that have been made of rail steel include: house and office furniture, agricultural implements, scaffolding and towers, posts, tools, fencing and many others.

The more common rail-steel products are made in a standard range of sizes in: hot-rolled bars and bands, bar-size shapes, concrete reinforcing bars, light rails and accessories, structural tubing, fence-post sections.

Hot-rolled bars and bands, as commonly defined in the rail-steel industry, include the following: rounds —¼ to 1⅝ in.; squares—¼ to 1½ in.; a middle range of sizes in octagons, ovals, triangles and diamonds, bands less than 13/64 in. thick in widths up to 4 in.; flats 13/64 in. thickness and over in widths up to 5 in.

Bar-size shapes are commonly defined as including: angles, tees, zees, channeled flats and U-bars under 3 in. in greatest cross-sectional dimension.

Other rail-steel products include: fence posts, special shapes, light rails from 8 to 60 lb. per yd., splice and angle bars for light rails, steel ties and clips for light rails, structural tubing in round, oval, square and rectangular cross-section from 0.84 in. to 2⅝ in. O.D.

Manufacturers' Standard Practice:

Permissible variations in size, length and weight of rail-steel bars and shapes (dimensions in inches).

Table 1—ANGLES

DIMENSIONS: Tolerances—over or under.

Specified Length of Leg	Thickness			Length of Leg		
	To 5/16" Incl.	Over 5/16" to 3/8" Incl.	Over 3/8"	To 5/16" Incl.	Over 5/16" to 1/4" Incl.	Over 1/4"
To 1" Incl.	0.008	0.010	.....	1/32	3/64	*
Over 1" to 2" Incl.	0.010	0.010	0.012	3/64	1/16	*
Over 2" to 3" Incl.	0.012	0.015	0.015	1/16	1/16	*

*By Agreement.

Note: The longer leg of an unequal angle determines the size for permissible variations. Permissible off square in either direction, 1½°

Table 2—SQUARE AND ROUND EDGE FLATS

Specified Widths	Thickness (Over or Under)		Width	
	To ½" Incl.	Over ½" to 1" Incl.	Over	Under
To 1" Incl.	0.008	0.010	1/32	1/32
Over 1" to 2" Incl.	0.012	0.015	1/32	1/32
Over 2" to 4" Incl.	0.015	0.020	1/16	1/32
Over 4" to 6" Incl.	0.015	0.020	3/32	1/16

Note: The standard classification of flat hot-rolled bars defines bars as not over 6 in. wide and not under 0.203 in. thick.

Table 3—ROUNDS AND SQUARES (Merchant Bars Only)

Specified Sizes	Variation from Size		Out-of-Round or Square
	Over	Under	
Over 5/16" to 7/16", Incl.	0.012	0.012	0.018
Over 7/16" to 5/8", Incl.	0.015	0.015	0.022
Over 5/8" to 7/8", Incl.	0.015	0.015	0.022
Over 7/8" to 1", Incl.	0.015	0.015	0.022
Over 1" to 1⅛", Incl.	0.020	0.020	0.030
Over 1⅛" to 1¼", Incl.	0.020	0.020	0.030

Note: Out-of-round is the difference between the maximum and minimum diameters of the bar, measured at the same cross-section. Out-of-squares is the difference in the two dimensions at the same cross-section of a square bar, each dimension being the distance between opposite faces.

Table 4—OCTAGONS AND HEXAGONS

Specified Sizes Between Opposite Sides	Variations from Size		Difference 3 or 4 Measurements
	Over	Under	
To 1/2", Incl.	0.010	0.007	0.015
Over 1/2" to 1", Incl.	0.015	0.015	0.020
Over 1" to 1½", Incl.	0.021	0.015	0.025

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LEBLOND

Rail Steel Products—II

For the purpose of ordering, it is industry practice to designate the nominal dimensions of bars in inches and fractions or decimals. Materials should be ordered in specified lengths or ranges of random length in feet and inches and, when multiple lengths are ordered, the specified lengths should include the amount required for any loss in cutting the desired number of units.

Specifications for definite long lengths with no shorts are acceptable, but are subject to negotiation. Orders are acceptable for given sections in total linear feet, total weight or specified number of pieces of a given length.

Straightness allowances:

For bars—rounds, squares, hexagons, octagons and flats: ½-in. camber in any 5 ft. but may not exceed ¼ in. multiplied by the length in feet, divided by 5.

For shapes: ⅛ in. multiplied by length in feet, divided by 5.

Weight variation: permissible variations in weight of bar-sized angles, tees and channels, 3½% over or under the theoretical weight.

Recommendations for punching, shearing and welding of rail steel, based on the experience of the Rail Steel Bar Association, are given on a following page.

Manufacturers' Standard Practice:

Permissible variations in size, length and weight of rail-steel bars and shapes (dimensions in inches).

Table 5—CHANNELS

Specified Size of Channel	Variations from Size—Over or Under				Taper of Outer Side of Either Flange per Inch of Width
	Depth	Width of Flange	Thickness of Web		
			To 5/16" Incl.	Over 5/16"	
To 1½" Incl.	1/32"	1/32"	0.010	0.015	3/64
Over 1½" to 3", Incl.	1/16"	1/16"	0.015	0.020	3/64

Note: Measurement for depth of section and width of flanges are over-all. This table does not include special channel sections.

Table 6—TEES

Specified Size of Tee	Width or Depth		Thickness of Flange		Thickness of Stem		Stem-Off Square
	Over	Under	Over	Under	Over	Under	
To 1¼", Incl.	3/64	3/64	0.010	0.010	0.005	0.020	1/32
Over 1¼" to 2", Incl.	1/16	1/16	0.012	0.012	0.010	0.020	1/16
Over 2" to 3", Incl.	3/32	3/32	0.015	0.015	0.015	0.020	3/32

Note: Stem-Off-Square is the variation from its true position on the center line of stem measured at the point. The longer member of an unequal tee determines the size for tolerances. Measurements for both width and depth are over-all.

Table 7—ALL BARS and SHAPES EXCEPT ANGLES

Rounds, Squares, Hexagons and Octagons	Flats		Variations Over Specified Length No Variations Under				
	Thickness	Width	To 5' Incl.	Over 5' to 10' Incl.	Over 10' to 20' Incl.	Over 20' to 30' Incl.	Over 30' to 40' Incl.
To 1", Incl.	To 1", Incl.	To 3", Incl.	3/8	1/2	5/8	3/4	1¼
Over 1" to 2", Incl.	Over 1"	To 3", Incl.	1/2	5/8	3/4	1	1½
Over 1" to 2", Incl.	To 1", Incl.	Over 3" to 6", Incl.	1/2	5/8	3/4	1	1½
Over 2"	Over 1"	Over 3" to 6" Incl.	3/4	1	1¼	1½	1¾
Other Sections except Angles Classified as Bars			1/2	5/8	3/4	1	1/2

Note: Where a plus or minus tolerance from specified length is desired and order so specifies, half of above tolerances may be taken over and half under.

Table 8—ANGLES

Angles Equal or Unequal Leg	Variations Over Specified Length for Lengths Given No Variations Under		
	To 10' Incl.	Over 10' to 20' Incl.	Over 20'
Any Dimen. to 3" Incl.	1/4	1/2	Table 7 Applies

Note: Where a plus or minus tolerance from specified length is desired and order so specifies, half of above tolerances may be taken over and half under.

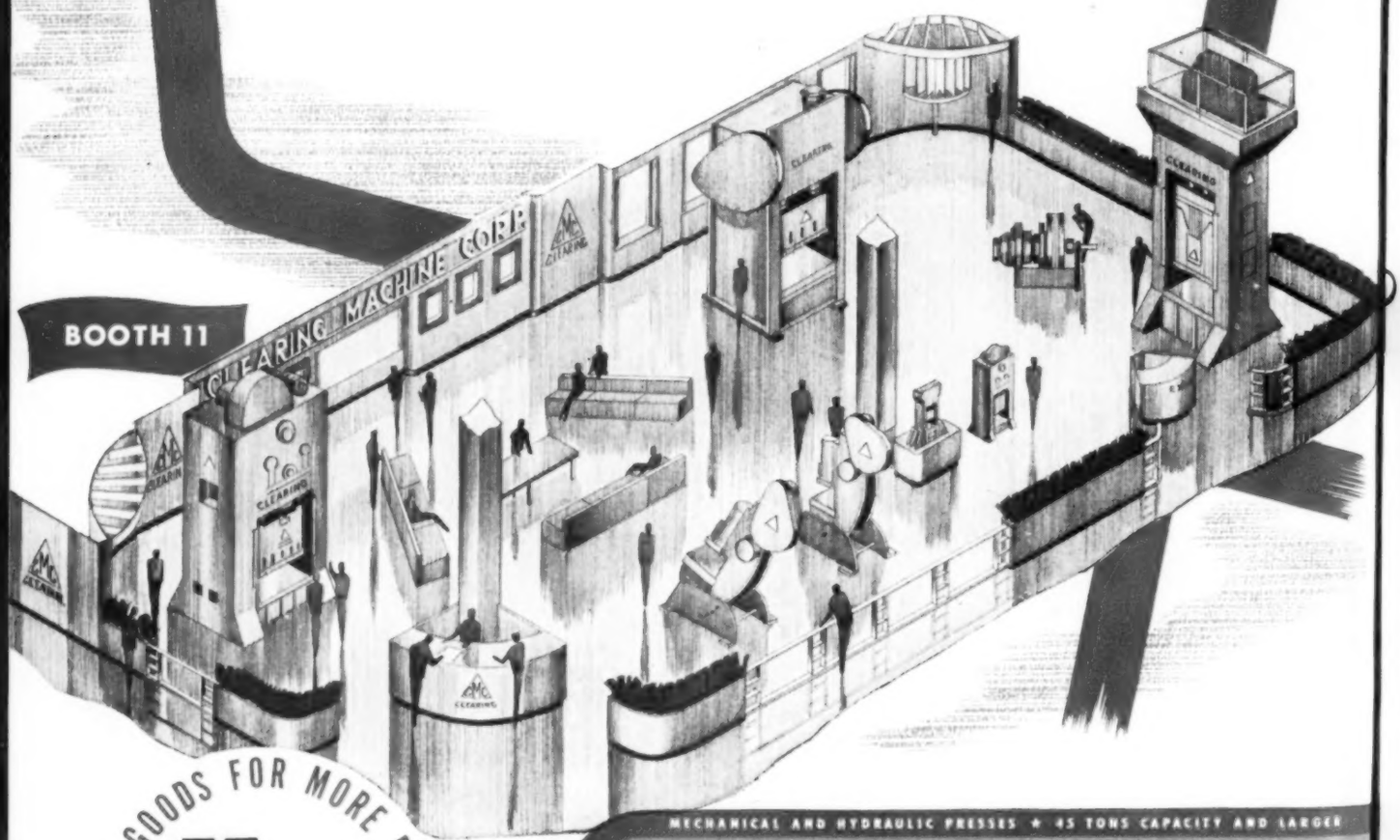
ACRES OF IDEAS

for Cutting Production Costs

The Machine Tool Show in Chicago September 17 to 26 affords an unparalleled opportunity to see and compare ways and means to reduce the cost of producing the things the world needs for better living. No industrial executive with his eye on the markets of tomorrow can afford to miss the information, the new ideas, and the practical examples so conveniently gathered together under one roof.

Clearing Machine Corporation is prepared to make its share of the show particularly worth while to those interested in producing large quantities of anything in metal or certain other materials. Clearing presses of various sizes, mechanical and hydraulic, will be there for examination—but equally important, Clearing engineers will be on hand during all show hours to talk about your specific needs and problems.

Even if you hadn't thought of *presses* as a means to lower your production costs, it might pay you to drop into Booth No. 11 while you're at the show.



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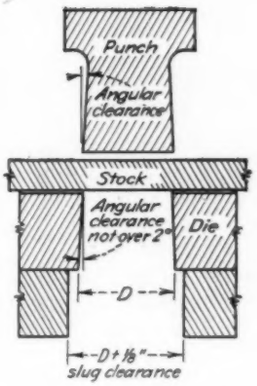
Fabricating Methods for Rail Steel



RAIL STEEL is harder and approximately 50% stronger than medium carbon steel. Hence, fabricating methods must be modified. The recommendations for punching, shearing and welding, as prepared by the Rail Steel Bar Association, are:

Punching

Die materials — Chrome-vanadium alloys are best for tools used for cold-punching; for hot punching, use alloy steels containing chromium and tungsten, or semi high-speed or high-speed steels. Hardness—punches, Rockwell 60 C.; dies, Rockwell 63-67 C.

Punch design—Some clearance is required: (1) to avoid pinching or wedging, and (2) to prevent excessive coldworking of the sides of the hole. Small punches may be flat-faced or crowned; no recommendations can be made for large punches. Keep over-all punch length short. Avoid sharp radii and corners.

Die design—A slight crown is desirable to compensate for wear. Wall thickness should not be less than one-half the punch diameter and never less than ¼ in.

Shearing

Shear blades—Use tool steel, heat-treated to avoid warpage, cracking and soft spots. Hardness, Rockwell 55-60 C. Slight lengthwise taper to blades will decrease shearing load, but if machine has ample capacity (assume strength of 100,000 psi.) straight blades prove more economical because the four edges can be used.

Method of shearing—Angles, legs down; U-bars, for general purposes, legs down; T-bars, for general purposes, stem down. Sliding contact of blades is recommended. Clearance greater than 0.001 in. results in poor work. Average speed, 25 strokes per min., based on a 2-in. stroke, or 8½ fpm. It is not possible to cut perfectly square. Shear table should be level with the knife.

Arc Welding

Rail steel is hardenable. To avoid cracks in or adjacent to weld, employ high heat input.

Electrodes—Use the cheaper AWS E 6012 where weld strength requirements are not severe; and E 7011 with a.c. for better strength.

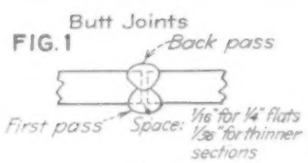
Arc length—Keep as short as possible. For multiple-pass welds, always use same direction of travel. Weld away from points of greatest restraint. Tack weld only at points subsequently fused to avoid hard spots.

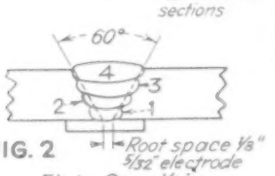
Electrode position—Perpendicular to work, except as illustrated.

Heat Input—$H = Eit/4.18L$, where: H = calories per in. of pass; E = arc voltage; i = amp.; t = seconds; L = length of pass in in. Check heat input periodically; use minimum values recommended below.

Arc Welding Recommendations

Weld Type	Rod Diam., in.	Calories H per in. of pass
Butt Joints:		
⅛" flats	⅛	5/16" flats—6500
Over ⅛"	5/32	⅜" flats—7800
Lap Joints		
⅛" flats	5/32	3900
¼" flats	5/32-3/16	7800
⅜" flats	3/16-¼	11,700
Corner welds in angles		
Joint A, Fig. 4, same as lap welds		
Joint B, Fig. 4, same as "Flats, Corner Welds"		
Joint A, Fig. 5, same as for flats		
Flats, Corner Welds		
⅛" plate*	5/32	2600
3/16" plate†	5/32	2900
¼" plate†	5/32	5200
* 1/32"	† 1/16" space	
Edge Welds		
For 2T (Fig. 8)		
¼	⅛-5/32	2600
⅜	5/32	3900
½	5/32-3/16	5200
Sheet Steel to Angles		
Angle Thickness		
⅛	⅛-5/32	2600
3/16	5/32	3900
¼	5/32-3/16	5200





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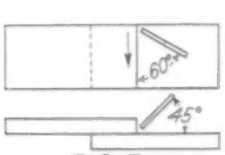


FIG. 3

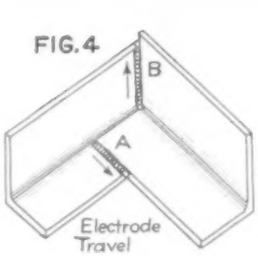


FIG. 4

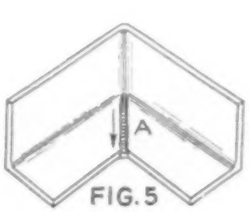


FIG. 5

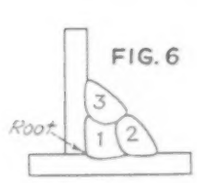


FIG. 6

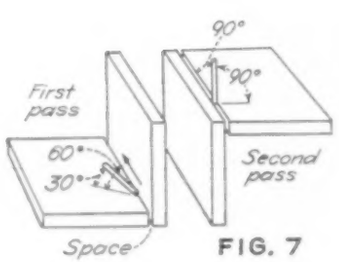


FIG. 7

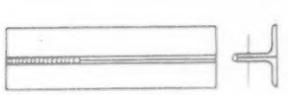
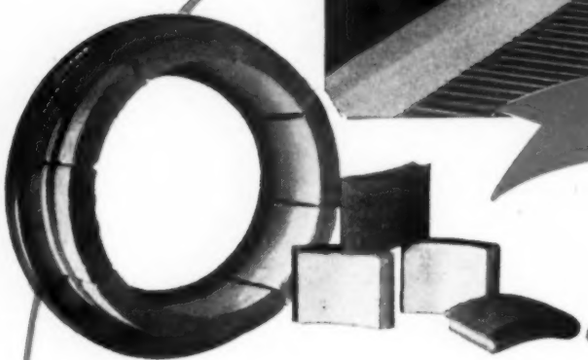


FIG. 8

FIG. 9

SIMONDS ABRASIVE CO.



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Simonds Abrasive Segments are made to fit all types of segmental chucks, solid or gap type.

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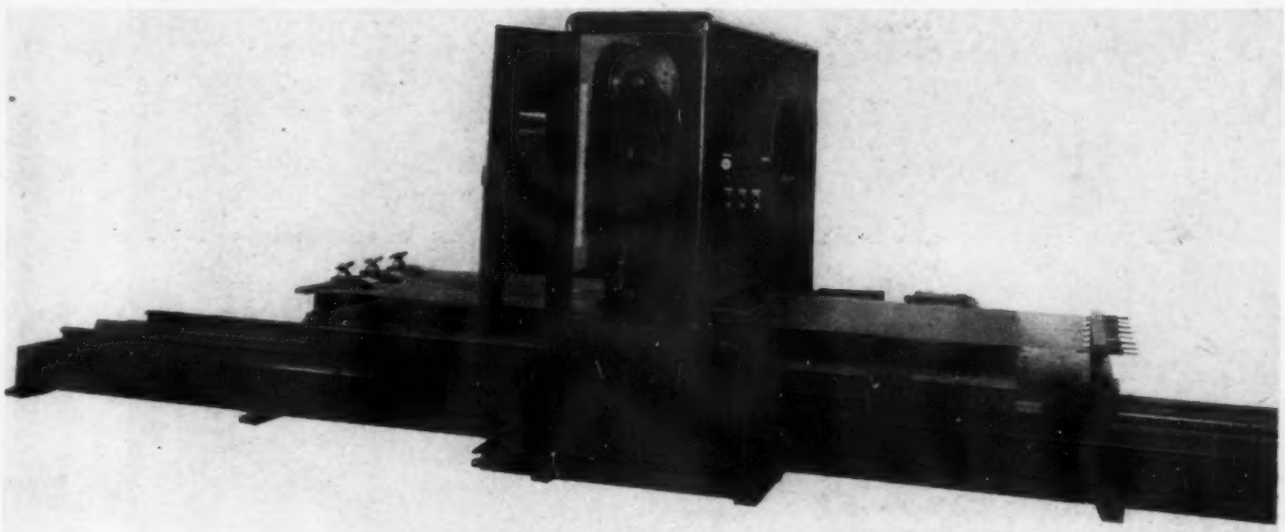
Shop Equipment News



The sheet-type machine incorporates a reciprocating hydraulic table drive. All controls are centralized

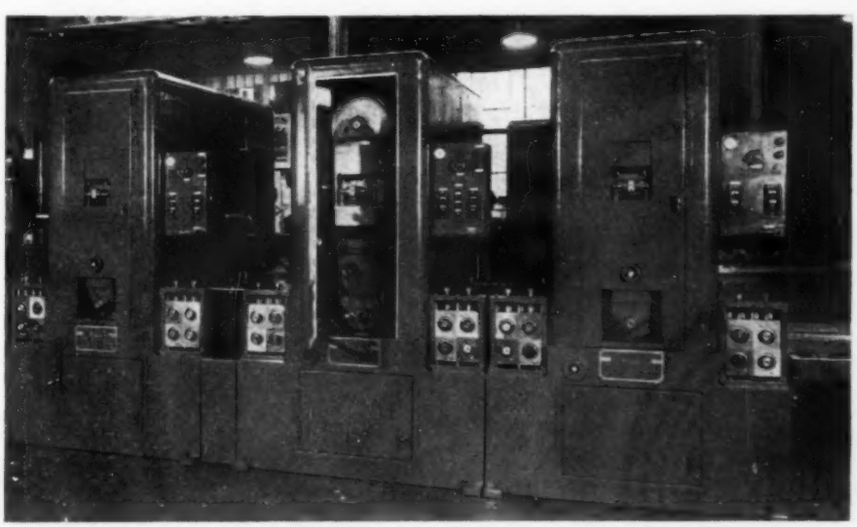
Three Types of Hill Acme Units Perform Flat Polishing

A line of 2-roll vertical abrasive-belt grinding and polishing machines has been developed by The Hill Acme Co., 6410 Breakwater Ave., N. W., Cleveland 2, Ohio. Available in three general types, the machines perform flat polishing of ferrous and non-ferrous metals and other materials.

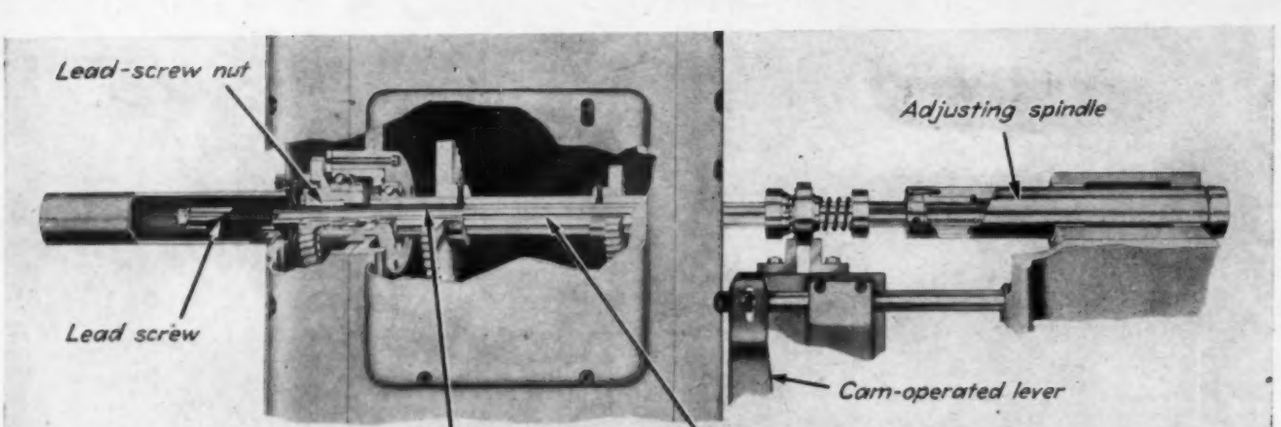
The strip-type unit processes strip material in coiled form. The plate or bar type incorporates feed or pinch rolls for conveying material under the polishing head. The sheet type uses reciprocating hydraulic table drive. The machines are built in a progression of widths up to 60-in. maximum. All principal parts are of welded steel.

The endless coated abrasive belts are 10½ ft. long, providing shorter change time than the longer belts previously used. The 2-roll vertical polishing head is the same on each type of machine. The abrasive belt travels over a dynamically balanced upper steel idler roll and a lower rubber-covered contact or work roll. The rubber-covered roll is the driving roll and is designed to prevent slippage and provide long belt life. A steel billy roll located directly beneath the contact roll is lowered or raised by means of air cylinders. A "Hill" pneumatic belt-centering device is said to provide positive tracking of the belt, regardless of moisture, dust or other conditions. The device is adjustable and accommodates various widths of abrasive belts.

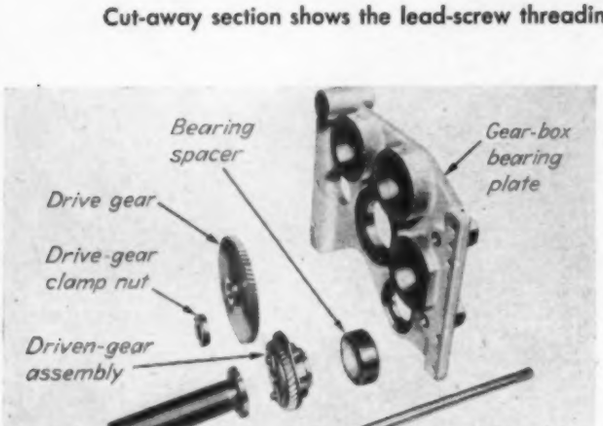
The work roll can be redressed in place at running speed. A steel redressing plate furnished as standard equipment is used for this purpose. Thus no separate grinding machine is required.



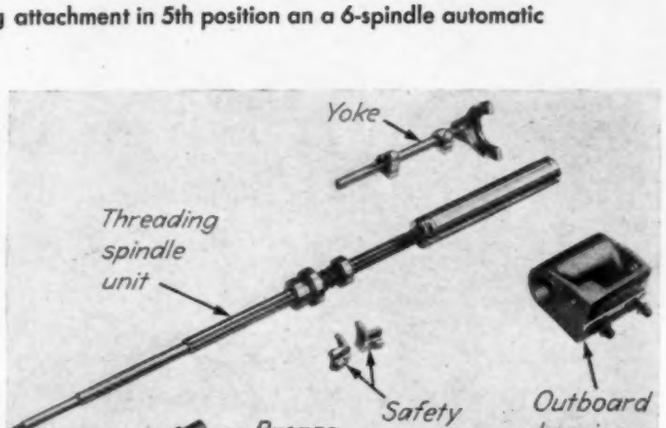
Both the plate- and strip-type machines can be adapted to multi-stage processing by placing a group of them in series for continuous polishing



Cut-away section shows the lead-screw threading attachment in 5th position an a 6-spindle automatic



These parts will convert existing Greenlee 6-spindle automatics to take the new lead-screw arrangement



Driveshaft of the threading spindle unit is about 10 in. longer than the conventional threading driveshaft

Greenlee 6-Spindle Automatics Add Lead-Screw Threading

An improved threading arrangement which is said to eliminate many secondary operations and speed production on work requiring threads with very accurate lead is announced by Greenlee Bros. & Co., Rockford, Ill. It is available for 6-spindle automatic screw machines of 1-, 1⅝- and 2-in. bar capacity. The new threading arrangement, which will be exhibited at the Machine Tool Show, can be added to existing machines.

The threading spindle driveshaft is driven by a splined sleeve. A section of the shaft directly ahead of the lead screw is relieved of splines. This section passes freely through the lead-screw nut permitting quick approach and return by the standard cam-operated lever.

After quick approach the lead-screw on the end of the driveshaft threads itself into a bronze nut, controlling threading-in of tap or die-head. At the end of the feed stroke a duplex clutch (standard in the gear box of all Greenlee automatics) changes the speed of the threading spindle causing the lead screw to thread out of the bronze nut and withdrawing the tool from the work. The cam-operated feed lever then causes quick return of the threading spindle to the starting position.

The lead screw and nut are both removable and can be changed to cut threads of different leads. A threaded adjustment feature of the attachment permits precise adjustments during setup.

For jobs where conventional cam-operated threading is preferred, it is only necessary to remove the lead screw and nut and to adjust the standard threading box cams to meet stroke requirements. No special cams are required for the new attachment. The standard cams operate the quick approach and rapid return. Either right- or left-hand threads can be cut without changing the direction of rotation of either the threading spindle or the work spindle. The duplex clutch and shifting mechanism provides the means of alternating the speed of the threading spindle for threading-in and threading-out.

Built-in splined sleeves for driving threading attachments in four positions are standard equipment on all Greenlee automatics. The cam-operated threading attachments can be used in 3d through 6th positions. The new. lead-screw threading attachments can be used in 3d, 4th and 5th positions.

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"ACCURACY UP 21%"
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Turning, facing, boring and threading operations are performed using the full range of speeds and feeds available on this modern machine with the latest in carbide tipped and high speed steel tools.

You too, will find Lodge & Shipley Lathes ideal for machining parts of widely varied nature. Call on your near-by Lodge & Shipley Representative for complete details or write for Condensed Catalog showing the complete Lodge & Shipley line.

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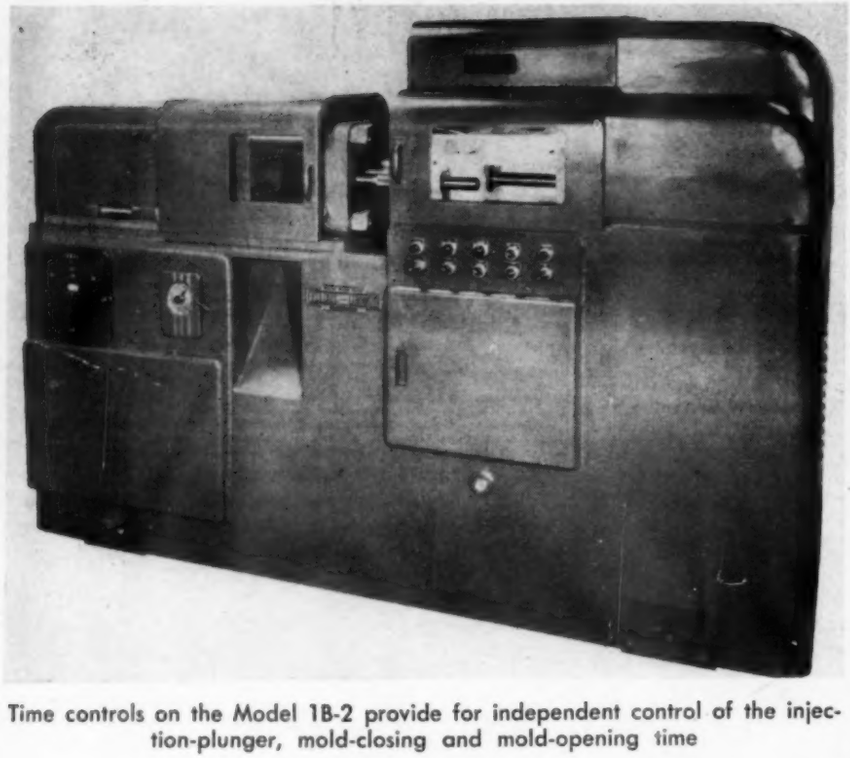


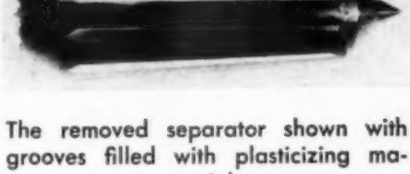
Time controls on the Model 1B-2 provide for independent control of the injection-plunger, mold-closing and mold-opening time

Fellows Injection-Molding Machine Handles 2 oz. of Plastic per Shot

The Fellows-Leominster 1B-2 plastics injection-molding machine is announced by Plastics Div., The Fellows Gear Shaper Co., Springfield, Vt. With a molding capacity of 2 oz. per shot, it has a speed up to 6 shots per min., depending on product and mold design. Plasticizing capacity is 45 lb. per hr., and other features are: 30-in. casting area, 150-ton clamp, 5-in. stroke, and enough platen area for 10½ x 13½-in. molds.

A central screw adjustment is designed to distribute clamping pressure evenly, minimize flash and cut down setup time required for various thicknesses of molds. The injection head is mounted on a hydraulically actuated movable slide and mechanically locked while molding. The head can be withdrawn by turning a selector switch, so that the heating cylinder can be purged or a stuck sprue cleared.

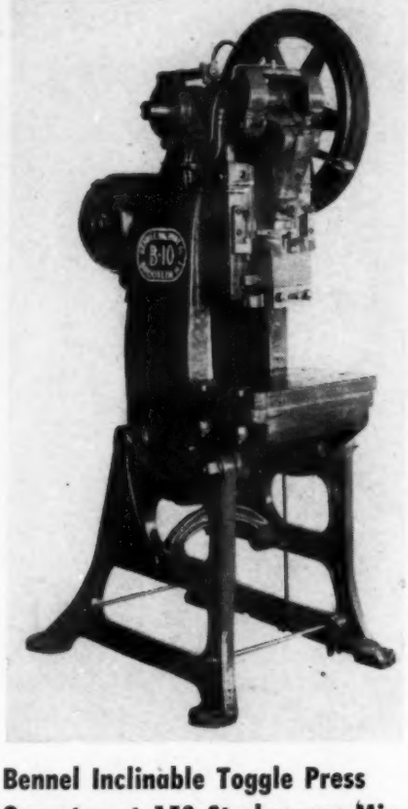
The hopper is hinged to facilitate change-over for different materials or colors. Hydraulic, electric and water-cooling controls are within easy reach of the operator for set up and automatic operation. Injection speed and pressure and speed of mold closing are controlled. Time controls are adjustable to the second. A Leeds and Northrup Electromax temperature controller, which has no moving parts and is vibration proof, is incorporated in the base of the unit.



The removed separator shown with grooves filled with plasticizing material

Outstanding feature is the design of the separator and heating cylinder. It is said to reduce molding temperatures and save power. The outer circumference (or "fins") of the separator is tapered smaller at the nozzle end to accommodate the tapered bore of the cylinder. Between the "fins" are semicircular grooves or channels, and the ends of the "fins" are tapered to assist flow of plasticized material. The separator and heating cylinder are said to act as a unit, maintaining a close fit so that no material is lodged between walls of cylinder and fins. The design thus prevents burning and consequent discoloration.

The sliding door on the press end of the machine is both electrically and mechanically interlocked to prevent the press from operating when the door is open. The injection end is also enclosed by a sliding door.



Bennel Inclinable Toggle Press Operates at 150 Strokes per Min.

A 10-ton inclinable toggle press has been developed by Bennel Machine Co., Inc., 20 Grand Ave., Brooklyn 5, N. Y. It is designed for operations such as blanking, forming, drawing and bending.

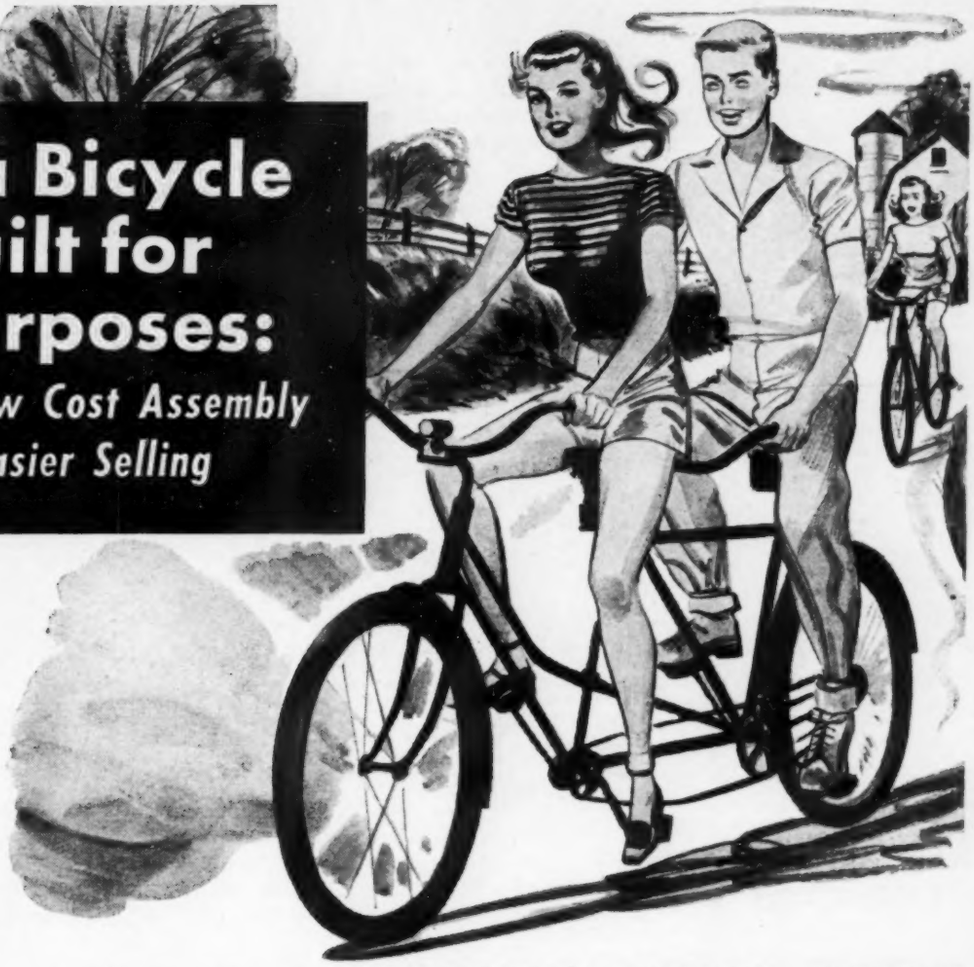
The unit employs diminishing speed on downward stroke and slow return stroke. This feature is said to eliminate the sudden rebound of spring pressure used on combination cut and draw dies. The impact of punch and die is thus slower.

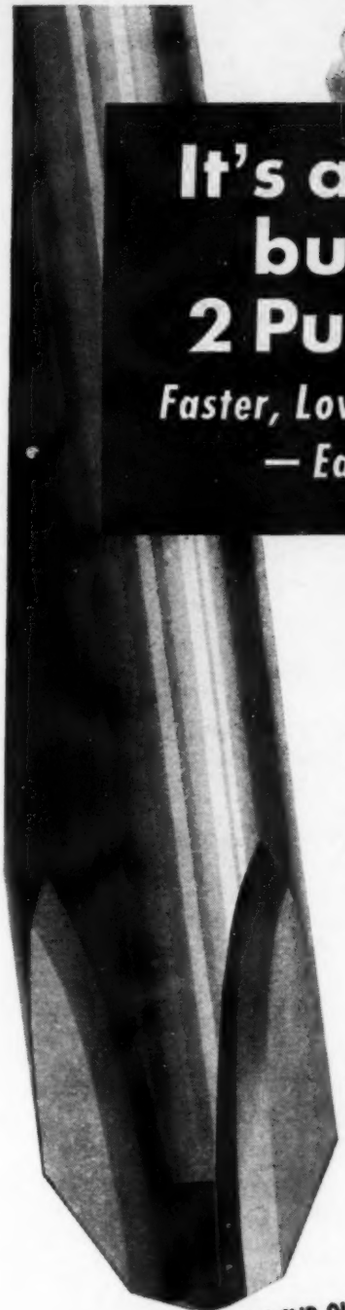
The press operates at 150 strokes per min. with a 2-in. stroke which can be increased or decreased by changing one link. A safety clutch prevents the unit from making more than one stroke, unless the operator depresses the pedal for each stroke. If the clutch is set in second position, the press may be run continuously. The clutch may be shifted from continuous to intermittent while the motor runs.

Floor space required by the unit is 26x36 in., while height is 72 in. The lubrication system is semi-automatic for all moving parts.

It's a Bicycle built for 2 Purposes:

Faster, Low Cost Assembly — Easier Selling





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ALL TYPES

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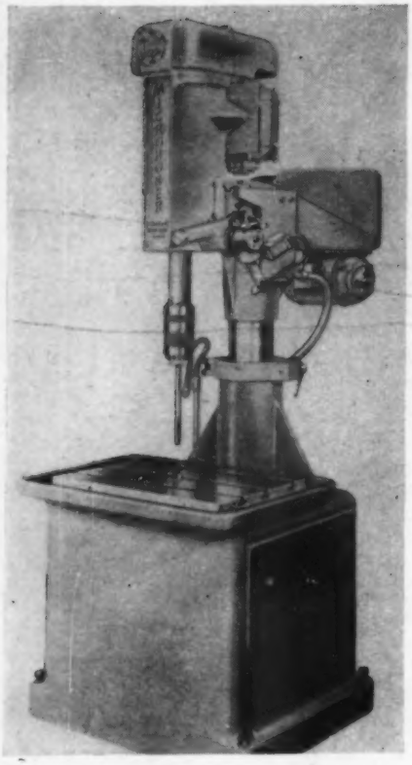
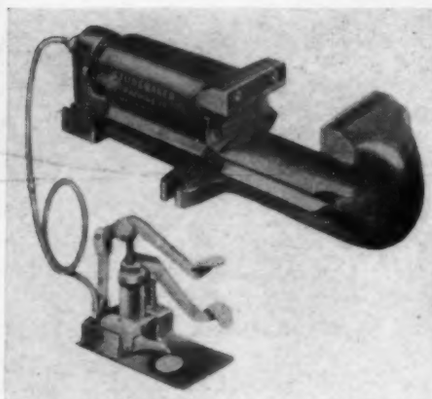


Line of Microhoning Equipment Performs Semi-Production Work

Line of Microhoning equipment for toolroom use, semi-production and reconditioning work has been announced by Micromatic Hone Corp., 8100 Schoolcraft Ave., Detroit 4, Mich. The equipment is known as the Microhoner machine and Micromold utility tools.

The Model No. 717 machine illustrated is an all-mechanical unit and has a capacity for bore diameters from ½ to 4 in. Stroke, reciprocation and rotation speed, and head to table distance are adjustable. Tool expansion is controlled by rotating an adjusting sleeve which is on the spindle but does not rotate with it. The tool may be expanded or collapsed at any time at a controlled rate by the operator. Working stroke is 6 in., and there is an additional 3½-in. lift-out stroke. Starters for rotation and reciprocation motors are interlocked with the lift-out arm; thus the operator need only shift the arm to stop, start or "inch" the spindle rotation and reciprocation.

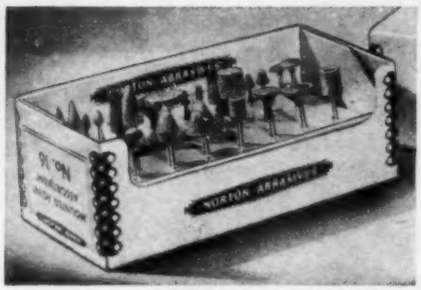
Five utility tools cover a range of bore diameters from 1 to 4 in. They employ Micromold sticks which have the abrasives encased in plastic stone holders. This eliminates the need for steel stone holders, shells and expanders. When the abrasive is used up, the entire Micromold abrasive unit is discarded and new sticks are inserted. The plastic case is said to control the breakdown of the abrasive to provide a more efficient cutting action.



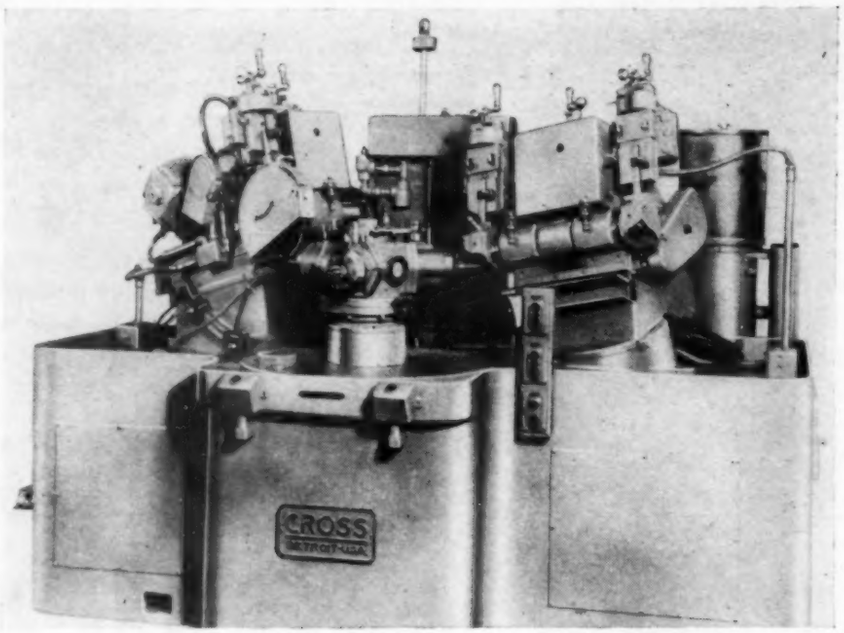
Studebaker Hydraulic Speedvises Built with V-Ways like Lathes

Two pedal-operated hydraulic Speedvises are announced by Studebaker Machine Co., 1221 S. 9th Ave., Maywood, Ill. They are designed to eliminate hinging action and adjustment for wear by the use of built-in gibs set at 45° angles in V-ways.

The vises are self-contained. With a few strokes of the pedal-operated hydraulic-pump units, pressure can be built up to 7½-ton squeeze. Jaw action can be controlled from very fast to very slow. The vises are portable and can be mounted horizontally or vertically. The No. 750 Torpedo model has 7½-in. maximum jaw opening with 7½-ton maximum squeeze, and the No. 500 Bullet has 5-in. maximum opening with 5-ton maximum squeeze.

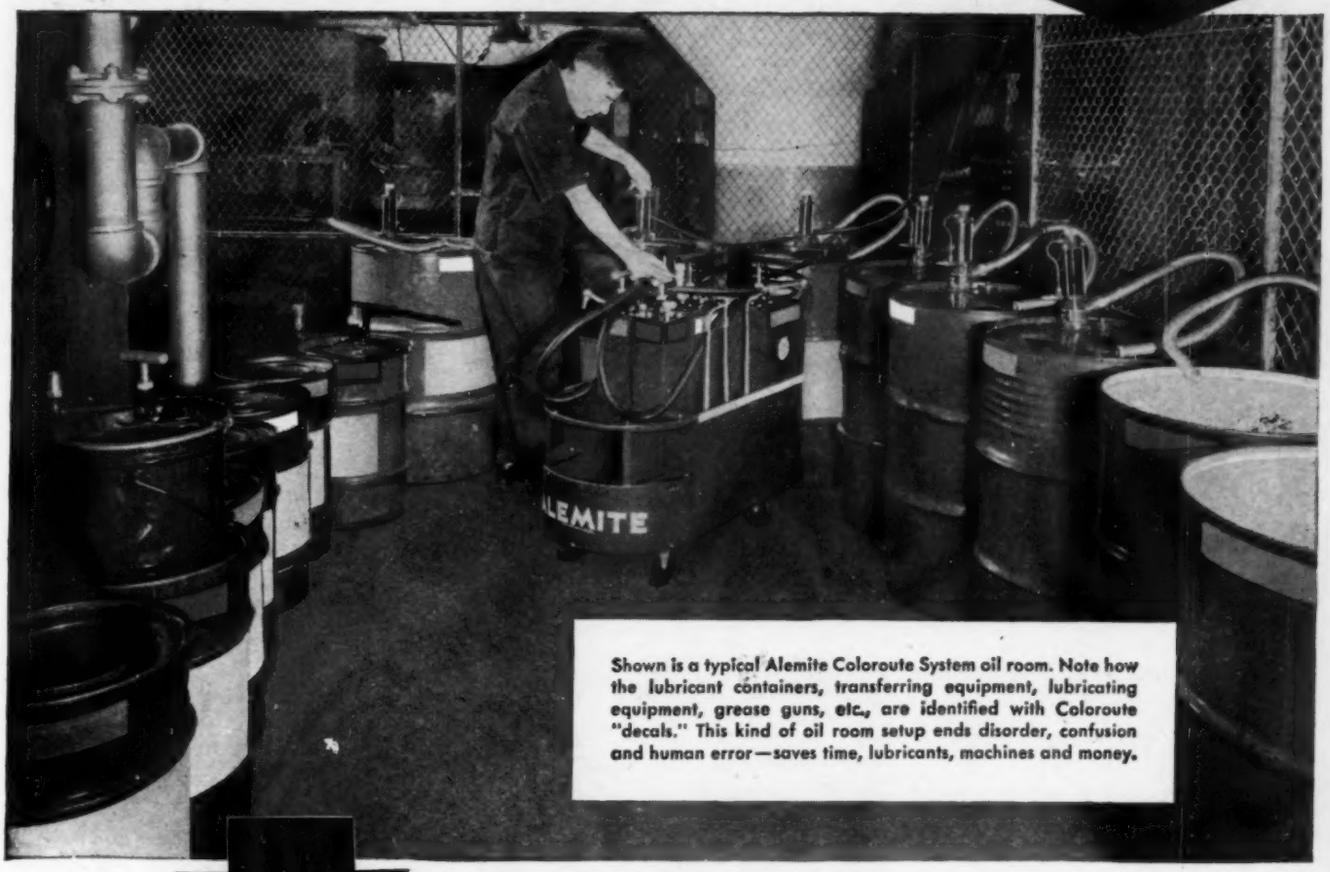


MOUNTED POINTS made up into a kit of 16 popular sizes and shapes by Norton Co., Worcester, Mass. Known as No. 16 Assortment, the points are made of 38 Alundum abrasive, vitrified bonded and strongly cemented on steel spindles. Each point has individual location in box stamped with name



SPECIAL MACHINE grinds teeth in spring clutches from the solid, simultaneously chamfers one side. First of three stations is for loading and unloading. Teeth ground on second station and chamfered on third. Parts indexed by power turret, also index on own axis at each station from one tooth to the next. Grinding wheels automatically dressed while turret indexes, while change in wheel size is also compensated for. When clamping lever is released, work stops rotating. Up to 200 eight-tooth clutches produced per hr. Made by The Cross Co., Detroit, Mich.

Good Lubrication starts with an orderly oil room like this



Shown is a typical Alemite Coloroute System oil room. Note how the lubricant containers, transferring equipment, lubricating equipment, grease guns, etc., are identified with Coloroute "decals." This kind of oil room setup ends disorder, confusion and human error—saves time, lubricants, machines and money.

YOU CAN CUT PRODUCTION COSTS BY MODERNIZING YOUR OIL ROOM

For the price of a 3 cent stamp, you can have the kind of oil room that takes all the guess work out of lubrication. You'll know for sure that the right lubricant will go where it's supposed to—that you'll have a ship-shape lubrication job down to the last machine.

Here's all you do. Make a check on your oil room right now. Then, think how much more efficient a new arrangement would be—how much an identification system would help to eliminate errors. Tell us how many types of greases and oil you use—or the number of "decals" you want. Give us the approximate number of containers, lubricating equipment, guns and other items you use.

Here's what Alemite will do. Fill in the coupon with the full information. We will then send you the Coloroute "decals" you need along with suggestions on how to design and operate an orderly oil room.

You buy nothing. This is simply Alemite's way of helping industry cut production costs through improved lubrication.

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Mail Coupon Today for Free Booklet and Alemite Coloroute "Decals"

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Please send *Free* booklet and... Alemite Coloroute "Decals." (Indicate quantity you need.)

*Company*_____

*Name*_____

*Address*_____

*City*_____ *State*_____

Variable speed of this unit is controlled by lever or pedal at operator's will. An extra keyway permits the resistance lug to be shifted

Beatty's Hydraulic Bulldozer Provides High Operating Speed

A 400-ton model welded-steel horizontal hydraulic bulldozer has been announced by Beatty Machine & Mfg. Co., Hammond, Ind. It is designed for heavy metalworking applications and features high operating speed in relation to its heavy size. Being hydraulic, it does not require that dies be minutely adjusted to prevent machine damage. Thus setup time can be considerably reduced.

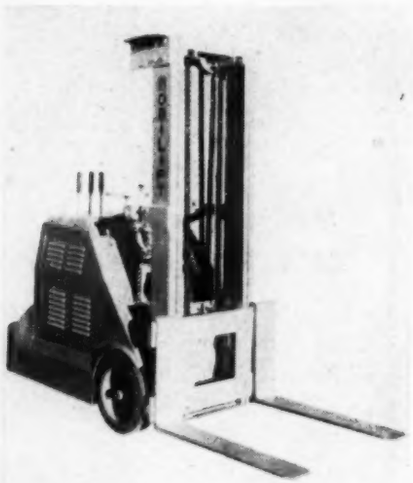
Stroke of the unit is 24 in. Maximum opening is 60 in., but an extra keyway is provided in the table so that the resistance lug may be shifted to give a 48-in. opening. Die space is 24 in., or 12 in. with lug shifted. Size of ram and resistance lug is 20x60 in.

Advance speed is from 0 to 144 ipm., press speed is 0 to 18 ipm., and return speed is 0 to 190 ipm. Speed is varied by amount of movement of the lever or pedal (there are levers and pedals on both sides of the machine). Stroke-adjusting rod collars permit the ram to be set for predetermined travel. Thus, to give a 12-in. stroke, the unit can be set to reverse after 12-in. travel.

The main cylinder is single action. The variable-delivery pump (with tank and motor installed) can be mounted above to conserve floor space. Also included is a double-acting rapid-advance cylinder.

DRILL SPEEDER fits into chuck of any standard drillpress, lathe, milling machine or special unit. A self-contained electric drill, it supplies own power (1/16 hp.). Speed is 1700 rpm. for drills from No. 80 to 1/8-in. dia. It is equipped with No. 2 Morse taper shank or 3/8-in. straight shank. Made by The Dumore Co., Racine, Wis.

HYDRAULIC UNIT pierces a total of 55 holes in four flanges of 8-ft. refrigerator door in single 7-sec. operation. Replaces four punch presses. Can accommodate other sizes of doors in change-over which takes one hr. Can be used for right- or left-hand doors by changing punches for hinge holes. Made by Vulcan Tool Co., 730 Lorain Ave., Dayton 10, Ohio. Principles of this unit are said to apply to almost any multiple hole-piercing operation



General Equipment Mobilift Turns in Radius of 61 In.

The Model F Mobilift lift truck has been announced by General equipment Co., Portland, Ore. With a rated capacity of 3,000 lb. on a 15-in. load center, the unit has a specially designed 20-hp. three-cylinder air-cooled engine. Weight is 4,450 lb.

No gear shifting is required. Overall turning radius is only 61 in. The truck is equipped with roller-chain lift to either 68 or 108 in. (underside of load).

18 Molds . . . Machined

● Total turning time is seven hours—on a set of 18 inserts (six of each) for a multiple-cavity gasket mold.

That's the Monarch-Keller production . . . contrasted with 60 hours, the time it took by more conventional machining methods. If you're looking for similar savings, it will pay you to investigate contour turning the Monarch way.

The Monarch-Keller was the *original* tracer-controlled lathe; over 1,000 are now in use. These Keller controls, adaptable to any Monarch Lathe above the 12″ size, permit fast, accurate, *economical* turning, facing and boring of irregular contours from a thin metal master template. When not in use, the controls can be quickly disconnected to permit regular turning work. For complete details, ask for our new bulletin 2401, on the improved Monarch-Keller Form Turning Machines.

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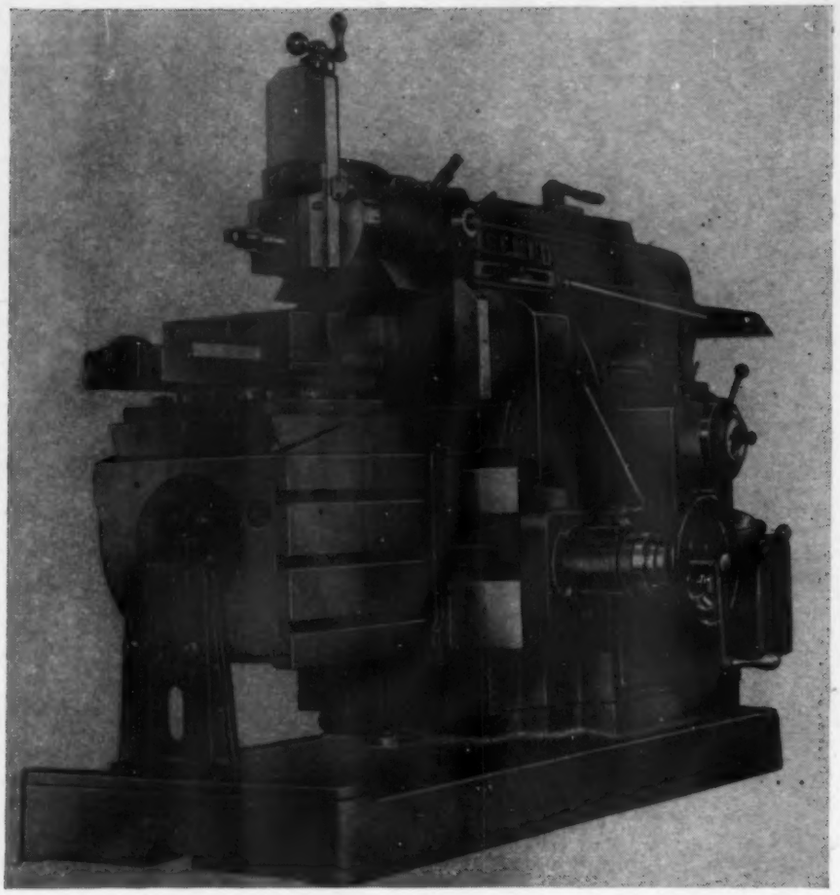
Monarch
TURNING MACHINES

THE MONARCH MACHINE TOOL CO., Sidney, Ohio

FOR A GOOD TURN *FASTER* — TURN TO MONARCH



A gear-shifting system on this shaper provides four-way control of feeds

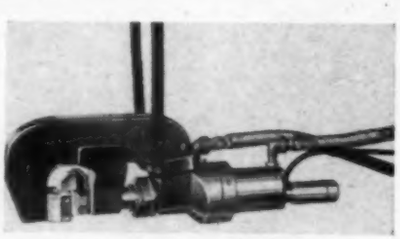
Gemco Multi-Purpose Shapers Have Improved Control Systems

General Engineering and Manufacturing Co., 4417 Oleatha Ave., Dept. AM, St. Louis 16, Mo., has built four improvements into the Gemco multi-purpose shapers.

Power rapid traverse is now controlled by a lever operating a clutch that normally engages the feed power to drive the worktable. When the lever is shifted, the clutch engages the power rapid traverse and the table automatically moves away from the work or opposite to the direction of feed power.

The handwheel is not only used to position the work minutely, but it is also employed as a gear-shifting device. When pulled to outward position it engages vertical power motion or feed. In inner position it engages horizontal motion. Vertical feed is geared to approximately 1/12 normal horizontal feed range.

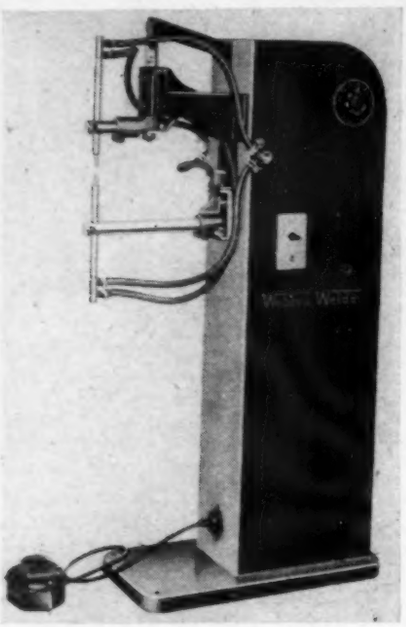
Both the oil pump and filter are now placed on the side of the column so they can be removed without disturbing pipe connections.



Heavy Cutting Work Performed By Hannifin Hydraulic Shear

A portable hydraulic shear has been developed for production cutting of assembled parts that cannot be placed in a power saw or otherwise held securely for cutting. Made by Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, Ill., the shear illustrated can exert 12½-ton shearing force. It was designed to clip off the ends of 1x⅜-in. copper bars after electrical windings had been applied.

The shear has applications where jobs are now done by hand hacksaws to finish assembled parts. Yokes are specially designed for "hard-to-get-at" places, and capacities are to 100 ton. The unit is controlled by a pushbutton on the shear connected to a hydraulic-pressure generator. When the button is pressed, an automatic cycle starts. The blades approach the work at low pressure, cut at full pressure, and .then retract when the cut is completed. The pushbutton is released and depressed again to start another cycle. The blades return to starting position if the pushbutton is released during any part of cycle.



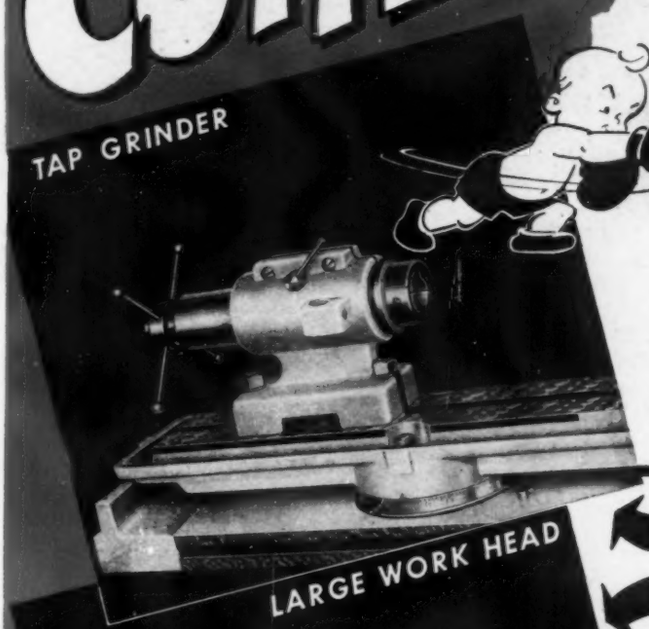
Weldex Automatic Spotwelders Do Continuous Production Work

Weldex, Inc., Dept. K, 7324 McDonald Ave., Detroit 10, Mich., has announced an electronically timed spotwelder series consisting of two models. The units are high speed, automatic and air operated. Model 752-P is a press-action type; model 752-R is a rocker-arm type. Both models are rated at 7½ kva. and are designed for continuous production welding on thin metals up to two thicknesses of 14-gage cold-rolled steel.

An electronic timer automatically controls all phases of the welding cycle. The welders have built-in transformer, tap-changing switch, single-acting air cylinder, adjustable air-operated pilot switch and a magnetic contactor. Standard equipment includes an adjustable air-pressure regulator, movable pushbutton footswitch, and water-cooled electrode holders and welding tips. Special arms, electrodes and platens are available for light projection welding.

FOR EASIER, FASTER, BETTER CUTTER GRINDING

USE "KNOCK-OUT" KO FIXTURES

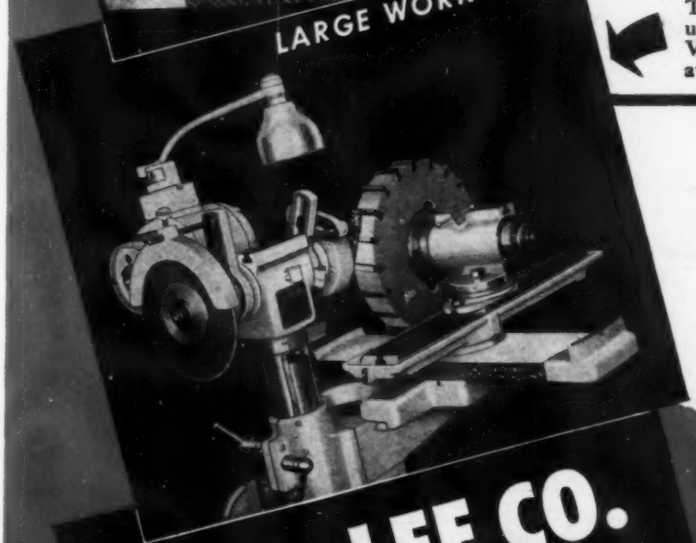


. . . more production per MAN HOUR with BETTER GROUND TOOLS!

Industrialists and labor leaders—economists and politicians—YOU and I agree that we need more production at lower cost. YOU can get more production per man hour with better ground tools—tools sharpened on "Knock-Out" cutter grinder fixtures designed to do a better job faster and easier.

Sturdy, compact tap grinding fixture accommodates taps from No. 8 to 2½", 2 to 6 flute. It is adaptable to any make of tool grinder.

This large sensitive ball-bearing workhead is fully universal and may be used on any make of tool grinder. Various collets, straight sleeves and taper sleeves are available.



The "Knock-Out" Tap Grinding Fixture (above) handles all taps from No. 8 to 2½"—grinds chamfer and flute—reconditions broken taps. You get more pieces per grind and more grinds per tap! With the "Knock-Out" Sensitive Work Head (right) it's easy to grind tools from keyway cutters to 12" mills. Set-ups are simple and fast—grinding is accurate—tools produce more pieces. These, and many other "Knock-Out" cutter grinding fixtures, will help you obtain better sharpened tools that will increase production per man hour.

K. O. LEE CO.

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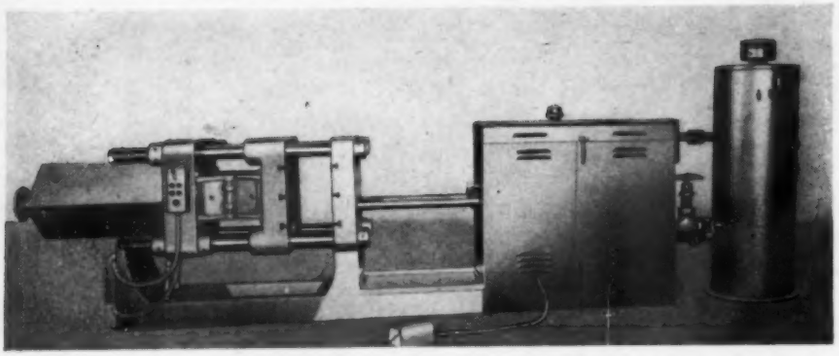
Gentlemen:

Please send us your fully illustrated catalog showing all of the various Knock-Out cutter grinder fixtures.

Name.....

City.....State.....



The capacity of this cold-chamber unit is 11.6-lb. of aluminum alloy or equivalent volume of other materials

Harvill Hydraulic Die-Casting Unit Converts from Cold to Hot Chamber

The Model HD-302 hydraulically operated die-casting machine is made by H. L. Harvill Mfg. Co., Corona, Calif. A heavy-duty type, it can be converted from normal cold-chamber operation to optional hot-chamber operation.

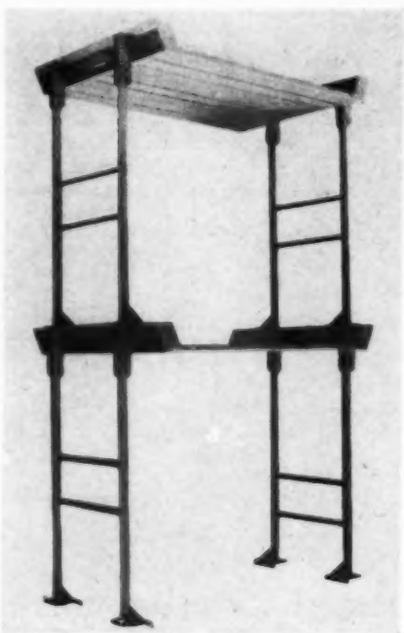
As a cold-chamber unit, the machine handles aluminum, magnesium and copper-base alloys. Zinc, tin and lead alloys may also be cast. The alloys are hand ladled from the holding furnace adjacent to the unit into the injection assembly, and as many as 300 shots per hr. can be made.

Metal is injected into die cavities under pressure from 3400 to 11,800 psi. The pressure is controlled by varying the piston size from 1¾ in. dia. (for the highest pressure) to 3¼ in. (for the lowest pressure). The minimum pressure is said to be 1400 psi. higher than the minimum needed to produce sound cold-chamber castings.

The HD-302 is converted to hot-chamber operation by installing a special self-contained conversion unit consisting of: holding furnace beneath the injection cylinder, blower and temperature-control unit, pump assembly with motor, and hot-chamber injection assembly. The injection assembly is not immersed in the molten metal, thus reducing deterioration. Pressures are said to be higher than conventional hot-chamber systems, reducing porosity and producing a good finish. The converted unit casts zinc, tin and lead alloys by the hot-chamber process.

Operation with either hot or cold chamber is manual or semi-automatic. Motions such as die opening and closing are time-cycle controlled with pushbutton start. Injection is accomplished by pedal, and controls are interlocked to prevent injection while dies are partially open. The hydraulic system is powered by a 15-hp. electric motor, while Vickers hydraulic equipment is used throughout.

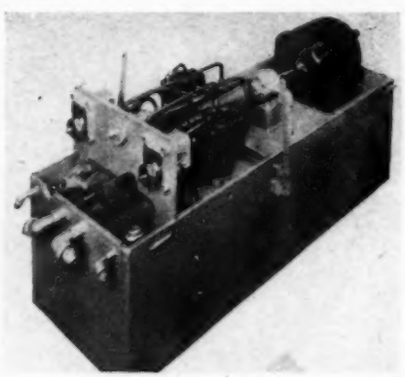
Die dimensions are 21 in. vertical by 31 in. horizontal. Die-locking pressure is 300 ton. Maximum closed die thickness is 28½ in., and dimensions between dies is 11½ in.



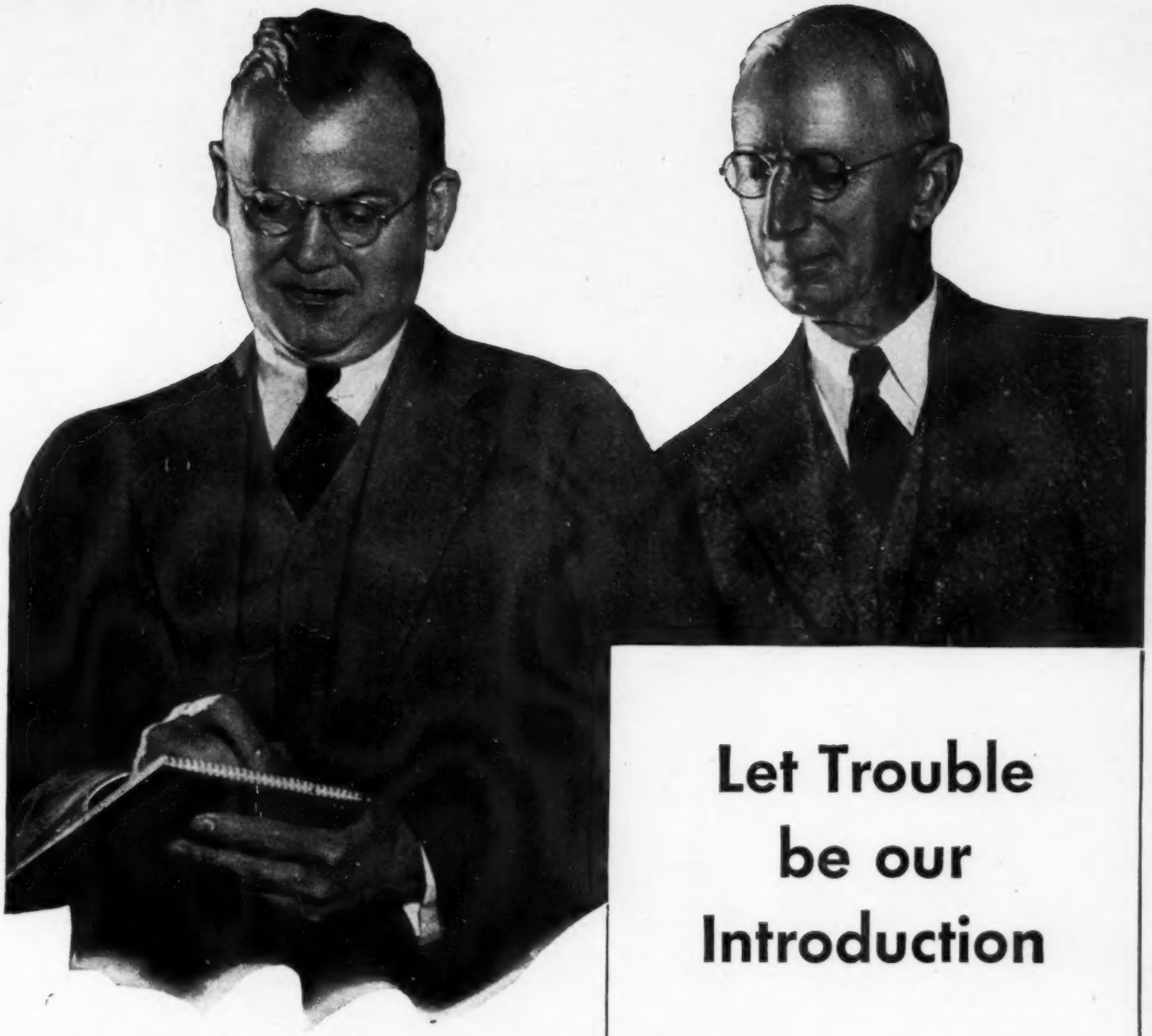
MULTI-STAK permits stacking of loaded pallets one upon another. Each unit holds 4000-lb. dead weight, has four securely anchored supports (made to specified measure) upon which succeeding pallets are piled and held. Supports are collapsible. Made by Pallet Div., Industrial Washing Machine Corp., New Brunswick, N. J.

Rodgers Mechanical Press No. 12 Hand Adjusted, Pedal Operated

Rodgers Hydraulic, Inc., Minneapolis, Minn., offers the Rodgers production press Whitley Model No. 12, a mechanical press with 1- to 4-ton capacity. Design of the unit permits ram or arbor to be rapidly adjusted to the work by hand. Then pressure is applied by foot. This leaves the hands of the operator free to adjust, hold or measure work. There are six positions between pedal and clutch providing variable pressure.



HYDRAULIC-POWER UNIT is self-contained with motor, pump, valves and flow control mounted above fluid reservoir and filter system. Activates any hydraulically driven machinery with both forward and reverse motion by means of selector valves. Meter flow controls provide wide range of speeds for driven machine. Simple and complicated units from 1 to 50 hp. made by Hufford Machine Works, Redondo Beach, Calif.



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THERE'S nothing like trouble to bring people together. That's how some of Revere's closest friends were gained—through a mutual struggle against difficulties, troubles such as occasionally beset any business.

Take the case of an important product, originally developed for war uses, now finding many applications in peacetime services. When manufacture began, rejections ran extremely high, over 40%, costs were skyrocketing, and badly-needed production was being lost. The maker asked if we would care to collaborate in solving the problem. Of course we would! After studying the subject in detail (and also under conditions of the greatest secrecy), we suggested a radical change in the properties of a non-ferrous metal used in the manufacture of the vital part with which so much trouble was being experienced. New processes of manufacture were developed, and in a short time test runs of the recommended material proved successful. Rejections of finished units dropped to less than 1%. Thus an expensive and vexing bottleneck was broken, and we gained a new customer and a firm friend.

This success story demonstrates that Revere has an open mind as well as an informed one, and is always ready to question the customary, find new answers to new problems, or to old ones, for that matter. If something is worrying you in your employment of non-ferrous metals, get in touch with Revere, not for ready-made answers, but for wholehearted cooperation, a joint search for better results. This help is given freely, without obligation, through the Revere Technical Advisory Service, which has at its command the knowledge and facilities of our laboratories, and the accumulated experience of the entire Revere organization.

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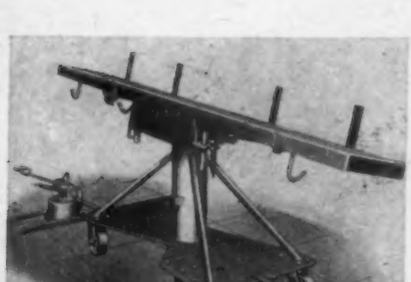
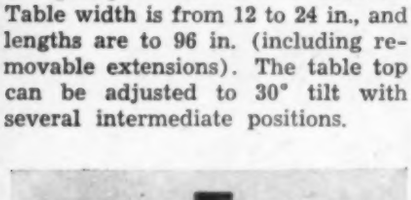


Lyon-Raymond Hydraulic Table Tilts to Feed Strip or Sheet

A tilting-type hydraulic table for feeding strip or sheet into inclined or horizontal presses has been announced by Lyon-Raymond Corp., 3469 Madison St., Greene, N. Y. When feeding into inclined presses, the correct angle of tilt is determined and the table top is locked with removable pins. It is free to elevate or lower at all times. Stock is said to feed with full support and proper leveling, eliminating strenuous manual handling.

Capacity of the unit is 2000 lb. Table width is from 12 to 24 in., and lengths are to 96 in. (including removable extensions). The table top can be adjusted to 30° tilt with several intermediate positions.

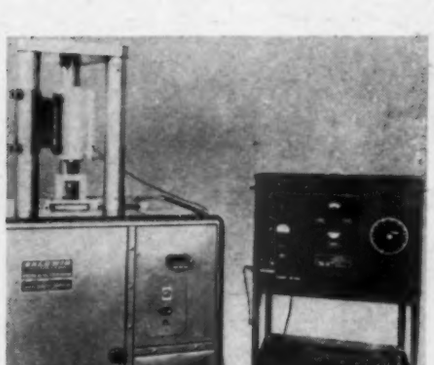


Jacobs Small-Dia. Tap Chuck Includes Rubber-Flex Collet

A small tap chuck which incorporates the Jacobs Rubber-Flex collet is made by the Jacobs Mfg. Co., 100 Jacobs Rd., Hartford 1. Conn. Designed in three models for tapping heads and machines, it covers a range from No. 0 machine screw to ⅝-in. hand tap.

The Rubber-Flex collet has several steel jaws bonded to a synthetic-rubber body. As the cap of the chuck is screwed onto the body, the collet is forced into a ground conical bore in the chuck body until it has a rigid grip on the tap shank.

Two detachable floating jaws are mounted in the body and connected by an operating screw which is operated by standard hex key for adjusting purposes. The jaws provide positive drive on the tap square.



Tension-Compression Testing Done by Sonntag SF-4 Machine

The model SF-4 Sonntag fatigue machine is announced by The Baldwin Locomotive Works, Philadelphia 42, Pa. It is equipped for tension-compression testing at both ambient and high temperatures. Embodying many of the principles of the Sonntag Universal fatigue machines, it provides a constant load throughout the entire test. Thus no recalibration is needed while the test is in progress.

The load is applied by a revolving eccentrically disposed mass. The eccentric can be adjusted by hand, and the amount of eccentricity is read like a micrometer in units of pounds. Tension springs are said to absorb 99% of vibratory forces.

Maximum capacity in either direction is 10,000 lb. Static preload capacity is 0 to 5,000 lb; alternating or dynamic load capacity is ± 5000 lb. (variations are said to be less than 2%). Speed is 3600 load cycles per min., and max. movement of reciprocating platen is ± 1/16 in. Weight of the unit is 3000 lb., and dimensions are 43x43x75 in. high.

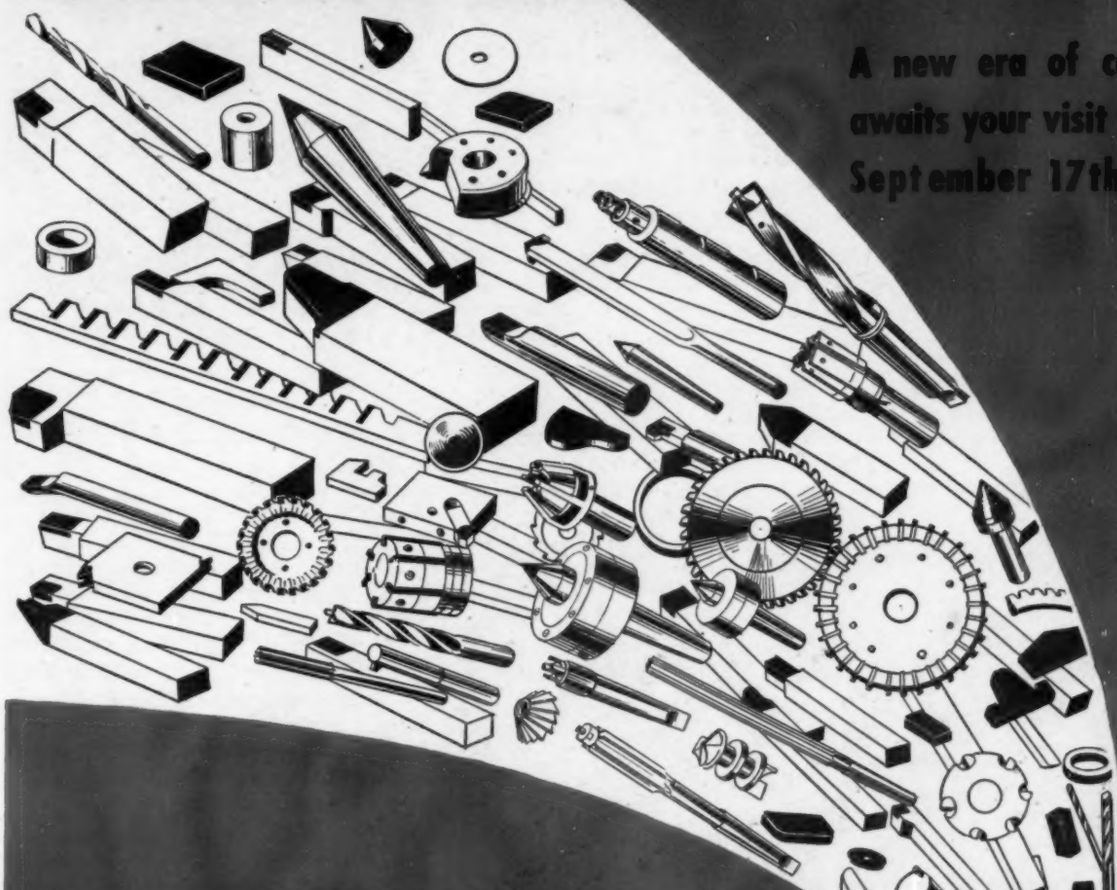
The power unit of this heavy-duty press brake mounts below floor level, leaving a clear working area behind and in front of the ram

Pacific Industrial's Press Brake Forms, Punches or Shears Plate

Pacific Industrial Mfg. Co., Oakland, Calif., offers a dual-cylinder hydraulically-operated press brake for forming, punching or shearing heavy plate. It is made in 12- and 14-ft. ram lengths, and each model has a rated capacity of 375 tons.

Full pressure is available at any point in the stroke, and stroke length is variable up to 6-in. maximum. The design provides instantaneous starting, stopping or reversal at any point in the stroke. Ram-leveling controls are said to hold the ram within 0.005 in. of level or of a preset tilt. No clutches, gears, crankshafts or eccentrics are used. A wide range of forming dies, punches and shearing attachments is available for this unit.

Look for CARBOLOY® throughout the Machine Tool Show



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Here is a "once-in-a-lifetime" opportunity to see . . . within a 9-day period . . . the most amazing array of new machine developments for the most effective utilization of carbide tools ever assembled under one roof.

"Today we are in the carbide era", **says Guy Hubbard, Machine Tool Editor, STEEL Magazine.** ***"The effect of carbide tooling on (machine tool) design has been equivalent to a gale of wind."***

Says Clayton R. Sutton in Wall Street Journal, ***"Manufacturers (users of machine tools) have one prime thing in mind . . . a crackdown on costs . . . (through) more speed . . . more precision . . . more versatility . . . to meet or undersell their competitors . . . Carbide-tipped cutting tools . . . open broad possibilities for speedier metal cutting."***

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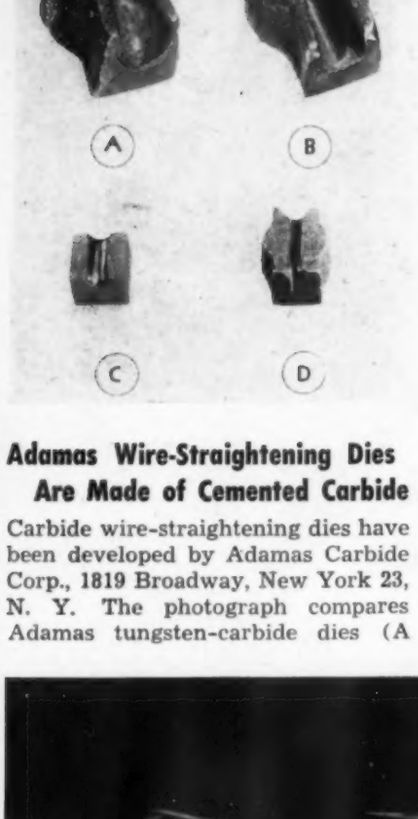


Adamas Wire-Straightening Dies Are Made of Cemented Carbide

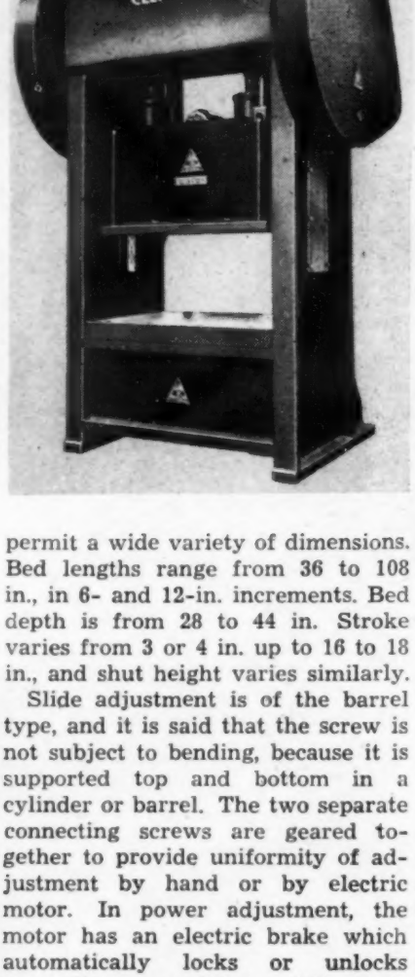
Carbide wire-straightening dies have been developed by Adamas Carbide Corp., 1819 Broadway, New York 23, N. Y. The photograph compares Adamas tungsten-carbide dies (A and C) with conventional chilled cast-iron and brass dies (B and D).

According to the manufacturer, the carbide dies provide a life of over 300 days as compared to a 2-day average life of the other dies. For wires from ¼- to ½-in. dia. a carbide insert made in a casting (A) is said to provide maximum wear with low cost. The solid-carbide die (C) is for smaller wires. It has a ground and lapped finish to eliminate scoring and scratching and to provide maximum die life.

Clearing Series "S" Presses Range from 60 to 250 Ton

Series "S" presses have been added to the line of Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill. They are double-crank type with twin end drives. Most sizes can be furnished either single or double geared, and capacities will range from 60 to 250 ton. They are smaller presses than any heretofore manufactured by Clearing.

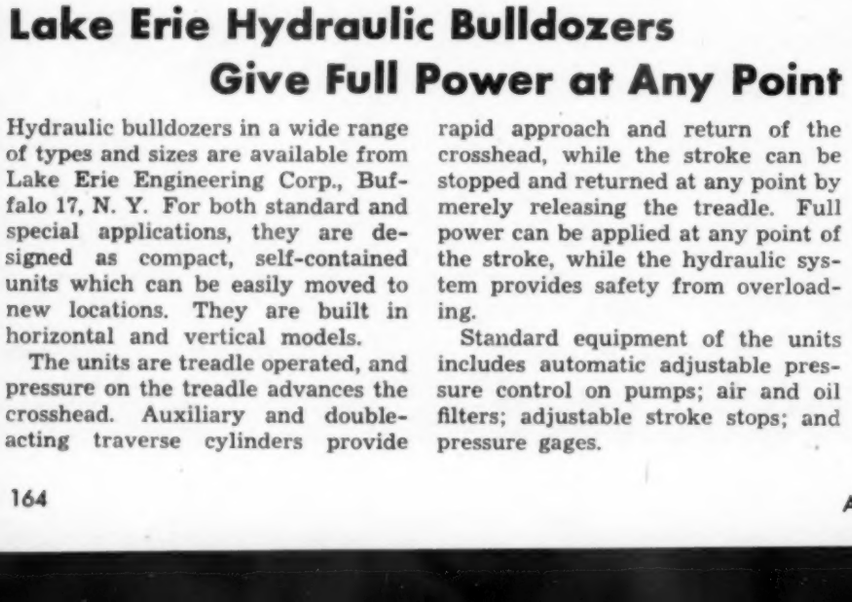
Frames are all-welded steel and



permit a wide variety of dimensions. Bed lengths range from 36 to 108 in., in 6- and 12-in. increments. Bed depth is from 28 to 44 in. Stroke varies from 3 or 4 in. up to 16 to 18 in., and shut height varies similarly.

Slide adjustment is of the barrel type, and it is said that the screw is not subject to bending, because it is supported top and bottom in a cylinder or barrel. The two separate connecting screws are geared together to provide uniformity of adjustment by hand or by electric motor. In power adjustment, the motor has an electric brake which automatically locks or unlocks the adjustment drive, while limit switches prevent over-adjusting.

Main feature for a press of this type is an air-friction clutch interlocked with a spring-actuated brake. The press is operated by electric pushbuttons at one or more stations in convenient locations for the operator.



The frame of this 50-ton bulldozer is constructed of heavy welded sections. Deflection under full load is said to be negligible, providing close die alignment

Lake Erie Hydraulic Bulldozers Give Full Power at Any Point

Hydraulic bulldozers in a wide range of types and sizes are available from Lake Erie Engineering Corp., Buffalo 17, N. Y. For both standard and special applications, they are designed as compact, self-contained units which can be easily moved to new locations. They are built in horizontal and vertical models.

The units are treadle operated, and pressure on the treadle advances the crosshead. Auxiliary and double-acting traverse cylinders provide rapid approach and return of the crosshead, while the stroke can be stopped and returned at any point by merely releasing the treadle. Full power can be applied at any point of the stroke, while the hydraulic system provides safety from overloading.

Standard equipment of the units includes automatic adjustable pressure control on pumps; air and oil filters; adjustable stroke stops; and pressure gages.

All-State No. 53 Welding Rod For Zinc-Base Die Castings

A low-temperature welding rod for zinc-base die castings has been announced by All-State Welding Alloys Co., Inc., 96 W. Post Rd., White Plains, N. Y. It has a 3/32 in. dia., round form, and working temperature is 400 F. Known as No. 53 zinc-base die-cast rod, it has 25,000-psi. shear strength. It is said to give excellent color match, and can be used with or without flux. Jobs can be performed such as repairing radiator grilles, hinges, door handles.

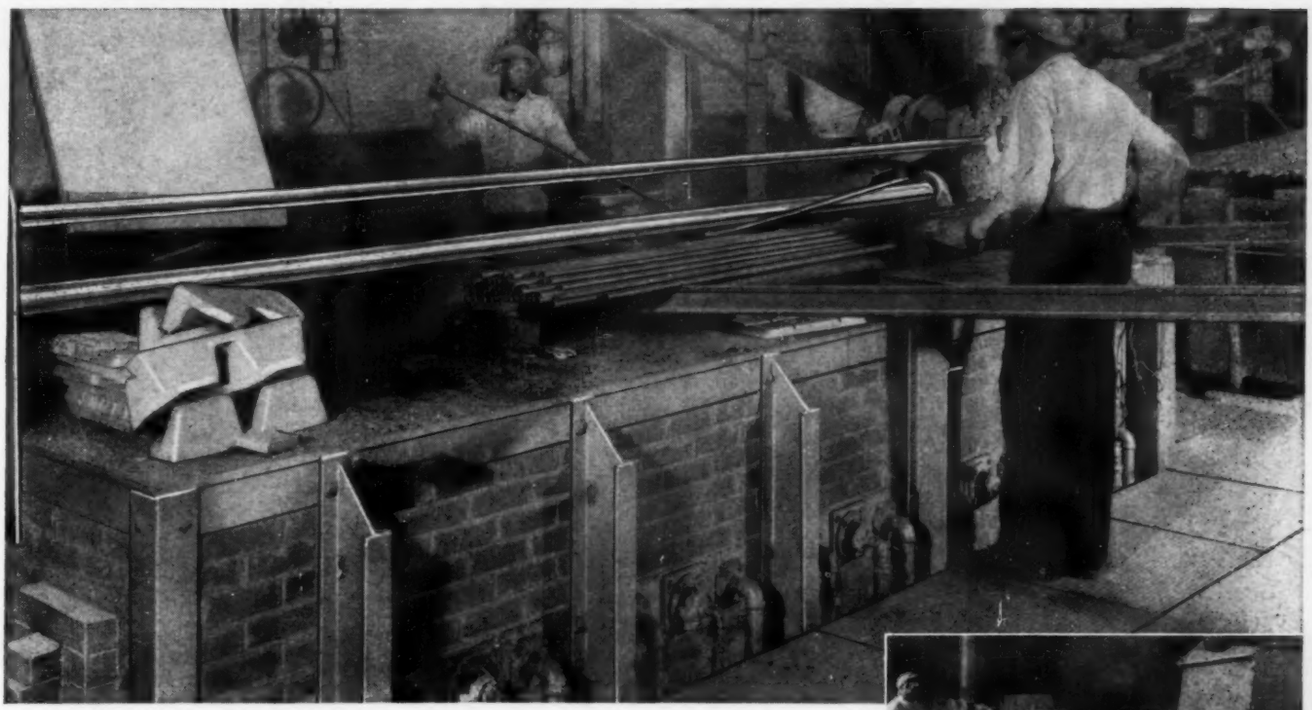
No. 75 of a Series of Typical Installations

Sunbeam STEWART

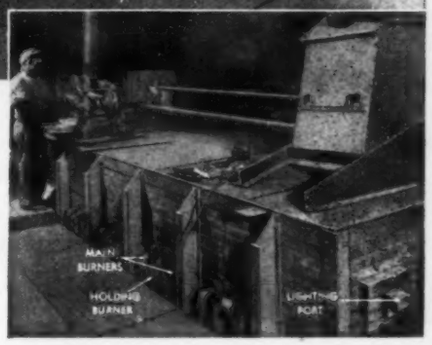
THE BEST INDUSTRIAL FURNACES MADE

For GALVANIZING CONDUITS

AT CLIFTON CONDUIT CO., BALTIMORE, MD.



Kettle dimensions of the Sunbeam Stewart High Side Fired Setting used by Clifton for galvanizing conduits are 40"x48"x13'. It is a high-side, gas-fired unit with baffle protection for the kettle.



Two zone burner control of the Sunbeam Stewart setting provides a flexible unit. Holding burners keep spelter in a molten condition while setting is idle.

SUNBEAM STEWART GALVANIZING SETTINGS GIVE YOU LOWER DROSS LOSS • LONGER KETTLE LIFE • HIGHER PRODUCTION

For the manufacture of conduits, Clifton required a setting that could provide a close temperature control of spelter. The reason: Their finished pipes had to have a smooth interior (to prevent a spur from stripping the wire insulation) and an outside dimension that adhered to a close dimensional tolerance (pipes were used with threadless fittings).

The Galvanizing Division of Clifton Conduit Co. has met these requirements with a Sunbeam Stewart setting. Kettle dimensions are 40"x48"x13'. The Sunbeam Stewart principle of High Side Firing provides the necessary close temperature control of spelter and even heat distribution. Burners fire against a protective baffle and provide a uniform flow of hot combustion gases to the upper part of the kettle. The gases travel downward to a point slightly above the dross where they are exhausted. This type of design assures (1) *long kettle life;* (2) *close control* of spelter temperature; and (3) allows *maximum production* per cubic foot of spelter. Moreover, by heating from the top and exhausting at a point near the bottom, a cleaner spelter results. Dross is held to a minimum.

Clifton's Galvanizing setting is typical of the many designed by Sunbeam Stewart to meet specific production requirements. In addition, Sunbeam Stewart builds a full line of standard furnaces.

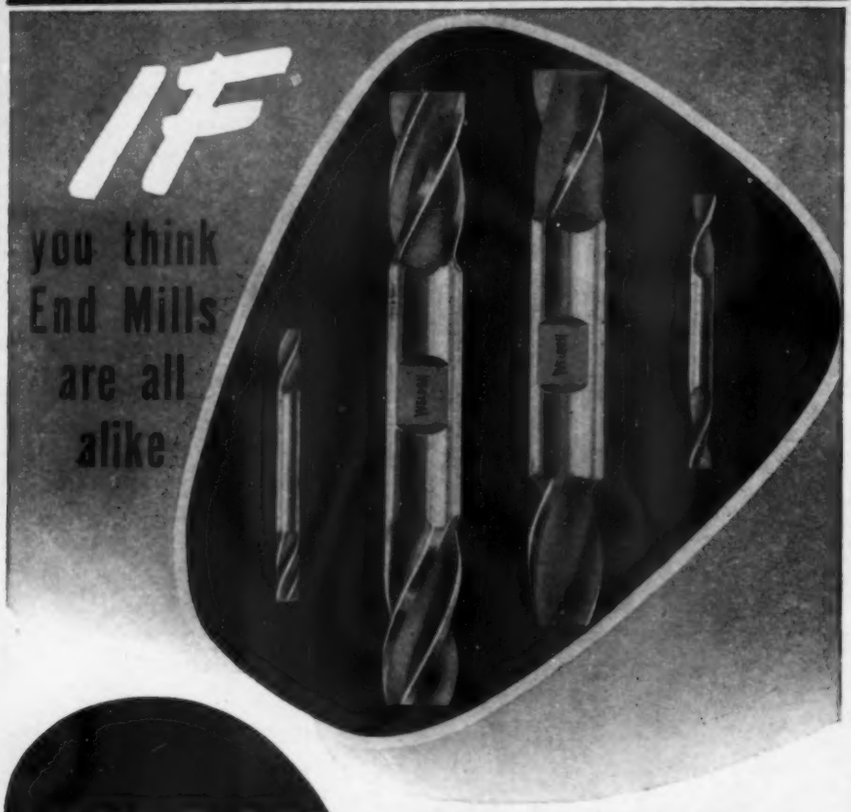
SUNBEAM STEWART INDUSTRIAL FURNACE DIVISION of SUNBEAM CORPORATION

(*Formerly* CHICAGO FLEXIBLE SHAFT CO.)

Main Office: Dept. 119, 4433 Ogden Ave., Chicago 23 — *New York Office:* 11 W. 22nd St., New York 18 — *Detroit Office:* 308 Boulevard Bldg., Detroit

Canada Factory: 321 Weston Rd., So., Toronto 9

YESTERDAY'S PIONEER • • • TODAY'S LEADER



WELDON **DOUBLE-END END MILLS**

offer definite superiorities

LESS BREAKAGE
UNIFORM HARDNESS
UNIFORM SIZE
UNIFORM FLUTE FORM
UNIFORM CLEARANCE
TRUE RUNNING
CLEAN CUTS

YES, Weldon Double-End End Mills have all these advantages. In addition they give you double the service for less than the cost of two single-end end mills of equal size. They save production time too because when you want to change the mill, you need only to turn it end for end.

Write for Catalog 8-B

THE WELDON TOOL CO. Cleveland 4, Ohio
3000 WOODHILL ROAD

Parts and Materials

PILLAR-POST UNITS for die-sets are adjustable for fit and future wear. Made by A. W. Grunow, Inc., P. O. Box 2, West Orange, N. J. Units have special steel-alloy housings said to be "diamond-bored" to squareness of 0.001 in. in 6 in. Post ends are tapered to facilitate removal

Self-Lubricating Bearings Made from Powdered Metals

A standard line of self-lubricating cylindrical bearings is manufactured by The Wel-Met Co., Kent, Ohio. Made from powdered metals, they have a self-contained oil supply. They are designed for aircraft, automotive, machinery and motor applications.

The copper-tin-lead composition is said to counteract shaft irregularities and eliminate damaging wear during initial operating period. In addition to bearings, the self-lubricating bronze is available in bar and plate stock.

Goodrich Paste-Forming Plastic For Molding, Coating, Dipping

Geon resin 100-X-26, a true polyvinyl chloride paste-forming plastic, has been announced by B. F. Goodrich Chemical Co., Cleveland, Ohio. Products that can be made from the

DEPENDABLE POWER

BARRETT-CRAVENS
POWER-OX LIFT TRUCK

EXIDE-IRONCLAD POWER
AND BATTERY ELECTRIC TRUCKS

Keep materials moving steadily, safely, at minimum cost . . . .

You can make substantial savings in materials handling costs by using the modern, efficient method employed by so many others throughout your industry. They have delegated their loading, unloading, lifting, hauling, placing and stacking to the time-and-cost-cutting team—battery electric trucks and Exide-Ironclad Batteries.

Exide-Ironclad Batteries have the high power ability, the high maintained voltage and the high capacity that materials handling requires. You can always count on Exide-Ironclad Batteries for dependability, long-life and ease of maintenance.

Write us for a FREE copy of Exide-Ironclad Topics which contains "Case Studies" of materials handling problems. It tells how to cut handling costs up to 50% . . . covers latest developments in handling materials from receiving to shipping.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 32
Exide Batteries of Canada, Limited, Toronto

BARRETT-CRAVENS
POWER-OX LIFT TRUCK

HOFFMAN *Fully Automatic*
FLOTATION EQUIPMENT

Saves "Down Time"

Boosts Production

Lengthens Wheel Life

Pays for Itself

A marvel of truly automatic convenience, the Hoffman Flotation unit clarifies soluble oil and water coolants by means of a unique and exclusive principle. No filter aids to add or change—no screens to plug—no need for constant maintenance. Dirty coolant enters a tank and is aerated by a rotor-stator. Waste solids are held in suspension by froth and skimmed off automatically. Clean coolant, of exceptional clarity, is continuously spilled into a reservoir for return to machine tools.

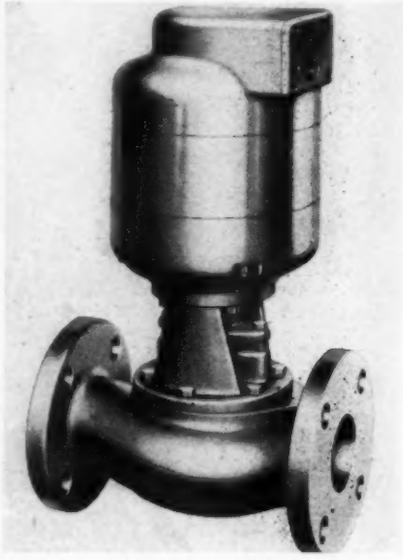
GET FULL DETAILS AND A FREE SURVEY

For increased machine tool productivity—longer wheel life and reduced maintenance, investigate Hoffman Flotation Equipment. Standard sizes with flow from 20 to 1,000 gallons per minute. Larger sizes available. Write today.

U. S. HOFFMAN MACHINERY CORPORATION
211 Lamson St., Syracuse, N. Y.
COOLANT FILTERS • FILTRATION ENGINEERING SERVICE

material include coatings for paper and fabric, thin films for raincoats and curtains, and thicker sheets for upholstery or shoes. The fabricating processes used are casting, molding, coating or dipping.

In original form the plastic is a free-flowing white powder with specific gravity of 1.40. It can be easily dispersed in plasticizer with the use of simple processing equipment. By employing proper heat-treatment, articles can be fabricated that are said to have the same qualities as those from standard Geon resins. Principle advantages are ease of fabricating and use of conventional equipment.



Rumaco 1-B Circulating Pump Has Totally Enclosed Motor

The Model 1-B Rumaco circulating pump has been announced by The Ruthman Machinery Co., Cincinnati, Ohio. Built on centrifugal principles, the pump is provided with opposed inlet and outlet for standard (125-lb.) 2-in. pipe flanges. It can be installed in various sizes of pipe lines by use of pipe reducers. It operates at any angle from vertical to horizontal. The direct-connected driving motor is a totally enclosed type. Equipped with grease-packed precision ball bearings, it needs no added lubrication. The motor stator is said to be dynamically balanced for quiet operation.

Optimus Cleaner for Aluminum Removes Dirt, Grease and Oil

Optimus Detergents Co., 34 Water St., Matawan, N. J., has developed a metal-cleaning compound designed especially for cleaning aluminum. Known as Optimus 101A, it is a blend

Now the school bus roars right past!

THE LITTLE RED SCHOOLHOUSE—home of a hundred pleasant memories of men who left it to build America—served well, had its day, and is going, going—or gone. Today, the community school bus, freighted with the hopes of a new time, roars right past to the big central school—advanced, scientific and better.

Going or gone with the little red schoolhouse, are countless industrial tools and methods you know. Once they were good, but now they're a drag on production. Efficient cutting tools today are tipped with carbide instead of steel.

When you install Nelco Carboloy-Tipped Cutters, and cut 100 slots in 1.4 hours instead of 3.2 hours—that's progress! That's cutting cost. That's boosting output. That's getting more pieces per man-hour. That's getting the jump on "little-red-schoolhouse" competition. That's just plain common sense.

Nelco Carboloy-Tipped Cutting Tools, with their tough, all-alloy steel bodies, can be mounted on standard equipment. They give you greater precision, finer finish, less tip breakage, more production, more profit. Let a Nelco Service Engineer show you how a moderate outlay for these modern tools will pay you many times over.

NELCO CARBOLOY-TIPPED TOOLS ARE **Sandwich Brazed**

Every modern technological development is utilized in making Nelco the finest of all carbide-tipped tools. Sandwich brazing is one example of that. A strip of non-ferrous metal between cutting edge and tool permits expansion and contraction—increases the life of every Nelco tool.

CARBOLOY-TIPPED CUTTING TOOLS

NELCO TOOL CO., INC.

FOR THAT EXTRA EDGE IN PRODUCTION

370 HAMILTON AVENUE, BROOKLYN 31, NEW YORK

WHY
CARRY
WHEN YOU
CAN
CONVEY

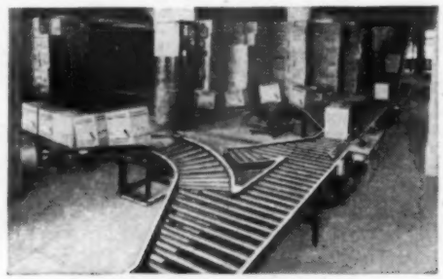
Carrying is the oldest form of material handling—modern production demands faster, cheaper and more efficient material handling — conveyors.

Investigate the use of conveyors. Conveyors handle a wide variety of parts, packages, units, cans, bottles, barrels, bundles, drums and boxes. Available in light, medium or heavy-duty types — portable or stationary — as systems, sections or units — power or gravity fed, they give you remarkable savings in time, money and manpower conservation. They relieve confusion and congestion.

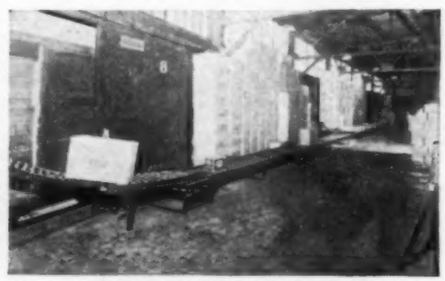
Standard Conveyor Company has the experience and facilities to engineer, recommend and furnish the right type of conveyor for your particular needs.

Write today for catalog No. AM-87 "Conveyors by Standard" — a ready reference on conveyor types and systems.

PRODUCTION LINES
No congestion — order and cleanliness when production moves on conveyors.

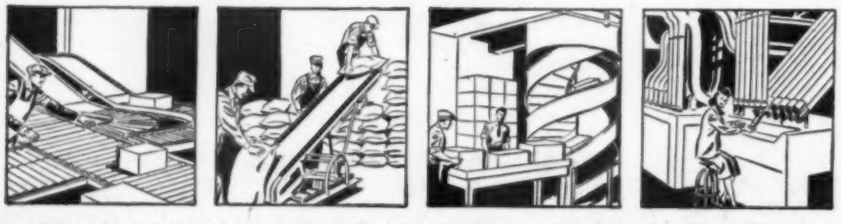


WAREHOUSES
Merchandise flows in and out of storage with order and system on conveyors.



LOADING DOCKS
Load or unload shipments in half the time with conveyors.

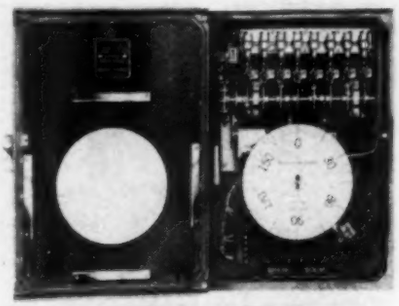
STANDARD CONVEYOR CO.
General Offices: North St. Paul 9, Minn.
Sales and Service in Principal Cities



ROLLER · BELT · SLAT · PUSHBAR CONVEYORS • PORTABLE CONVEYORS AND PILERS • SPIRAL CHUTES • PNEUMATIC TUBE SYSTEMS

of medium-duty cleaner, including water-softening materials and inhibitors to prevent attack on the metal. It is effective for cleaning dirt, grease and oil.

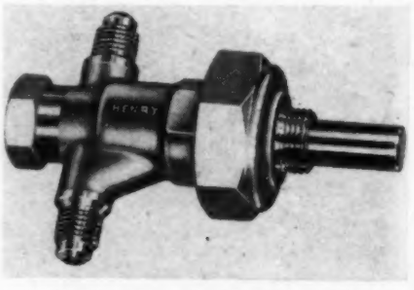
It can be used as a soak cleaner. In this application the work can be the cathode and cleaned electrically (this process does not apply to aluminum). It can also be used for hot-tank applications between 140 and 180 F.



Bristol Time-Cycle Controller Uses Notched Aluminum Disk

A multiple-cam time-cycle controller has been developed by The Bristol Co., Waterbury 91, Conn. It is known as Model C500 Impulse-Sequence Cycle Controller and is used to time mechanical operations in sequence such as opening and closing valves, switches, dampers and presses, and the starting, stopping or reversing of motor-driven pumps and blowers.

Time measurement and pilot-valve operation are handled by separate mechanisms. Timing is accomplished by a Telechron-driven aluminum disk with a 25-in. time scale. Notches are cut in the disk, and their locations determine the time of operation of the cam mechanism. Time impulses are transmitted electrically to the cam mechanism.



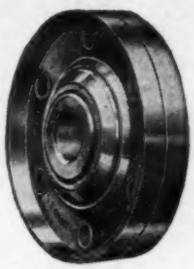
Henry Pushbutton Packless Valve Designed for Instant Operation

A pushbutton packless valve has been introduced by The Henry Valve Co., 3260 W. Grand Ave., Chicago 51, Ill. With a brass forged body, it is suitable for handling oil, water, air or any substance not corrosive to brass. It is normally open and designed for manual or automatic instantaneous

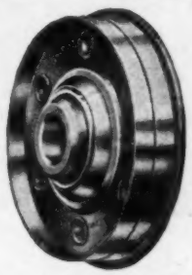
NICE
BALL BEARINGS
and
other ANTI-FRICTION PRODUCTS

SERIES 2000 SHEAVES
Pressed Steel Ball Bearing Sheaves for rope, wire rope and special uses.

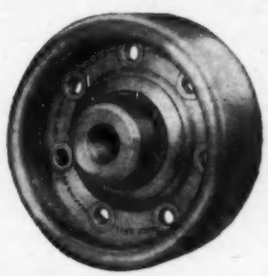
SERIES 2100 WHEELS
Wheels—Pressed Steel Ball Bearing—for flat chain or belt application and other uses.



SERIES 2200 WHEELS
Many-purpose Wheels — Pressed Steel Ball Bearing—for straight, flat tread surface applications.



SERIES 2300 WHEELS
Pressed Steel Ball Bearing flanged tread wheels for application to wood rollers, tubes, etc.

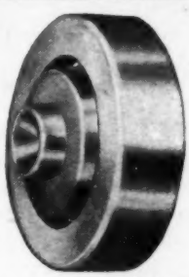


RED DIAMOND CASTERS — SERIES 2400 WHEELS
Swivel and Stationary heavy duty Ball Bearing Pressed Steel Caster Assemblies and Caster Type Truck Wheels for floor surface and special purpose applications.

Illustrated and described for your consideration, are some of the "OTHER ANTI-FRICTION PRODUCTS" made by NICE.

Designed and produced by the same skilled technical and production personnel that has made NICE BALL BEARINGS nationally known for 44 years, these supplementary ball bearing products incorporate the same assurance of quality and price advantage that only many years of manufacturing experience can provide.

For price and engineering data on the complete line of NICE BALL BEARINGS AND OTHER ANTI-FRICTION PRODUCTS, write for CATALOG NO. 125.



SCREW MACHINE RADIALS
A variety of special Radial Bearings, flat, curved and grooved tread Rollers now available from existing tooling. New items can be designed and produced to match individual specifications.

I-BEAM TROLLEY WHEELS
Pressed Steel Ball Bearing — available in many types, with and without flanged tread, for monorail service and special track applications.

NICE

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Get it Quickly from Ryerson Stocks

Have you considered stainless steel for every application where its corrosion resistance, everlasting brightness and long life will save money or increase the sale of your product? You can easily try it because Ryerson stocks of Allegheny stainless are as near as your telephone and we're just as pleased to furnish a single piece for experimental work as a large shipment for quantity production.

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Allegheny stainless brings gleaming brightness and long life. Your nearby Ryerson plant brings fast, friendly service. So step up the performance of your equipment, the quality or appearance of your product with Allegheny stain less from Ryerson stocks. Contact the plant nearest you.

JOSEPH T. RYERSON & SON, Inc. Steel Service Plants at: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles.

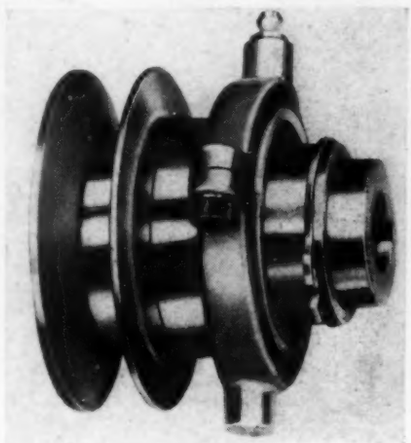
DO YOU WANT A CURRENT LISTING OF RYERSON STAINLESS STOCKS?
We would be glad to send you the current Stainless Steel Stock List, showing sizes actually on hand in the following stainless products:

Plates	Hexagons	Angles	Pipe Fittings
Sheets	Squares	Pipe	Welding Electrodes
Rounds	Flats	Tubing	Fastenings

RYERSON STEEL

valve operation where leakage around conventional packing is not objectionable.

The valve has a renewable disk, a renewable diaphragm and a threaded collar around the pushbutton, which permits it to be mounted through a flush panel opening. It takes pressures to 100 psi. and is furnished in sizes from ¼ to ½ in. in male SAE, IPS or female solder connections.



Ball-lok Friction Clutches Developed for V-Belt Drives

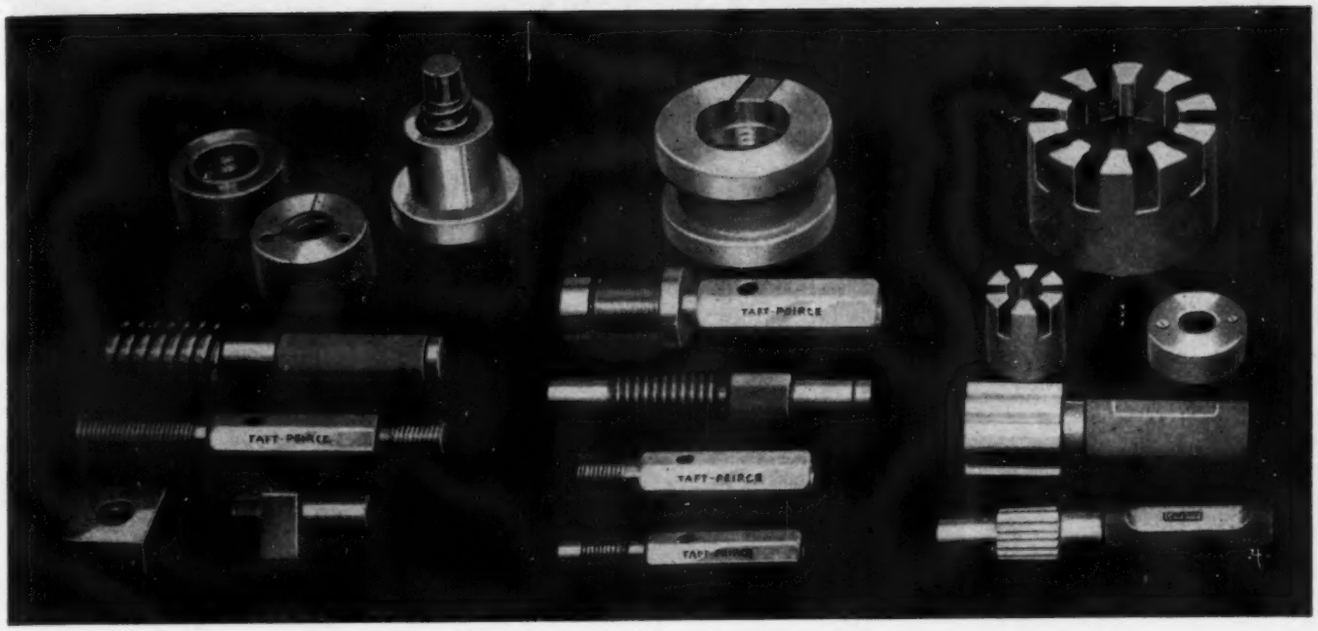
A V-belt friction-drive clutch has been developed by V-belt Clutch Co., 3757 Wilshire Blvd., Los Angeles 5, Calif. Known as Ball-lok clutch unit, it may be used either as driving or driven pulley. It is designed to grip or release directly on V-belts. The clutch action is the grip of the sidewalls of the pulley against the belt. When the clutch is opened, the belt slackens and idles on a free-running ball bearing with no attendent belt drag or creep.

Four available sizes have 3¼- to 5-in. sheave dia. and are from 2 15/16 to 3 1/16 in. long. Two can be applied to ¾-in. shafts, and two to 1-in. shafts. Weight is 44 to 54 oz.

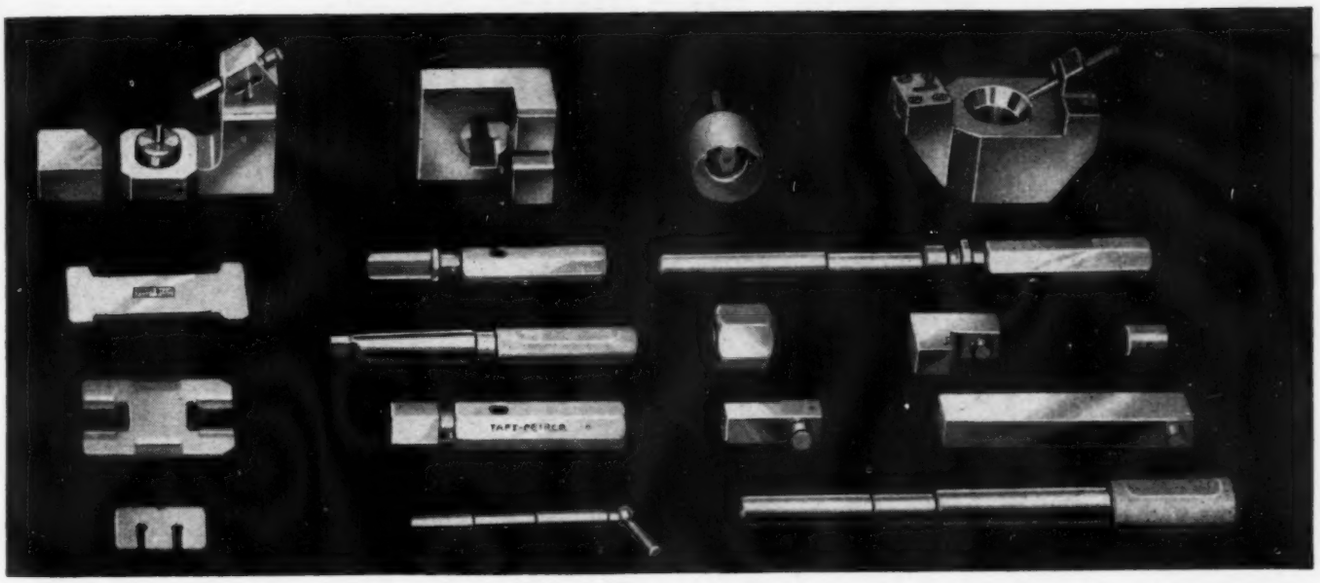
Monsanto's New Polystyrene Has Quick-Setting Properties

Lustrex, a polystyrene which can withstand scalding and actual boiling for short periods of time, has been announced by Plastics Div., Monsanto Chemical Co., Springfield, Mass. Said to have improved physical and molding properties, it has a flexural strength of 12,000 to 14,000 psi. While the heat-distortion point is 190 F., molded parts have been boiled from 10 to 15 min. with no visible distortion.

No modifications nor alterations are needed when Lustrex is molded in standard injection and extrusion



When You Need a "CUSTOM-MADE GAGE"—



make it a custom to TAKE IT TO TAFT-PEIRCE

As "The House of *T*op *P*recision," T-P makes a complete line of standard gages — plain and thread plugs and rings, snaps of all types, gage blocks, and many others — all of which bear the famous T-P gage trade-mark.

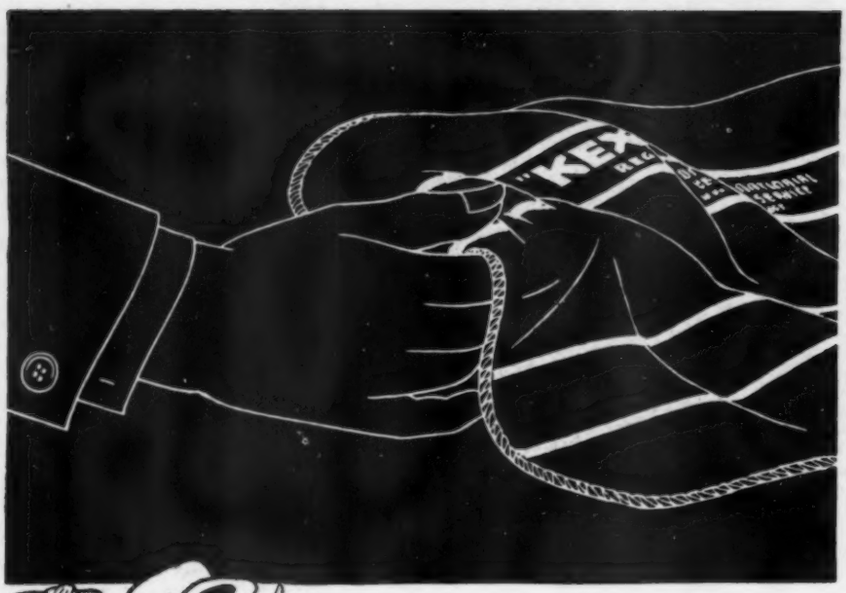
But beyond this, Taft-Peirce also produces to customers' blueprints almost every type of special gage you can think of — splines, flush-pin gages, contour gages, built-up fixture gages — you might say, "Everything in the way of out-of-the-way designs." The ultra-modern gage-making facilities of the Taft-Peirce Small Tool & Gage Division are unsurpassed in industry today.

That's why so many gage-users customarily take to Taft-Peirce their entire requirements for custom-made gages. You too will find it good business to send your blueprints to The Taft-Peirce Manufacturing Company, Woonsocket, R. I.

Visit Taft-Peirce at the *Machine Tool Show* Booth 601

USE T-P Taft-Peirce Gages

FOR EVERY GAGING NEED



Any way you look at it

"KEX" INDUSTRIAL WIPING TOWELS *are SAFE!*

Safety—KEX Wiping Towels have no uneven, ragged edging that can catch onto and damage machinery, or cause accidents. They are unlike cast-offs that have served other purposes or their usefulness. A KEX towel is compact and adapts itself to the hand. Their smooth textured surfaces and finishes are important safety factors.

Hygiene—KEX Wiping Towels are thoroughly clean—made that way by a special high heat process, delivered fresh, on regular schedules, and in required amounts.

Economy—KEX Wiping Towels are rented. Nothing to buy. No expensive inventory. Just a low monthly rental. The first month should show you an appreciable saving on wiping costs.

Softness—You can use KEX Wiping Towels on the most delicate polished surface. There isn't a hard seam, button or bit of hidden abrasive to scratch or mar.

Usable Space—Big, tough and uniform in size, KEX Wiping Towels can be used right to their very edges.

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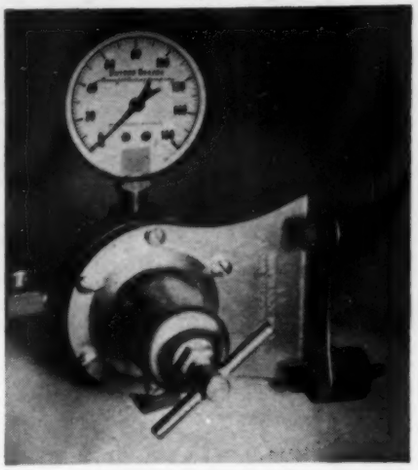
A CALLAWAY MILLS PRODUCT
INDUSTRIAL WIPING CLOTHS

machines. It has been found helpful to increase ram pressures 100 to 200 psi. and cylinder temperatures 25 to 60 F. Quick-setting properties are said to provide reductions in molding cycles as large as 30%. The properties of Lustrex make possible the molding of articles which formerly utilized cellulosic compounds.



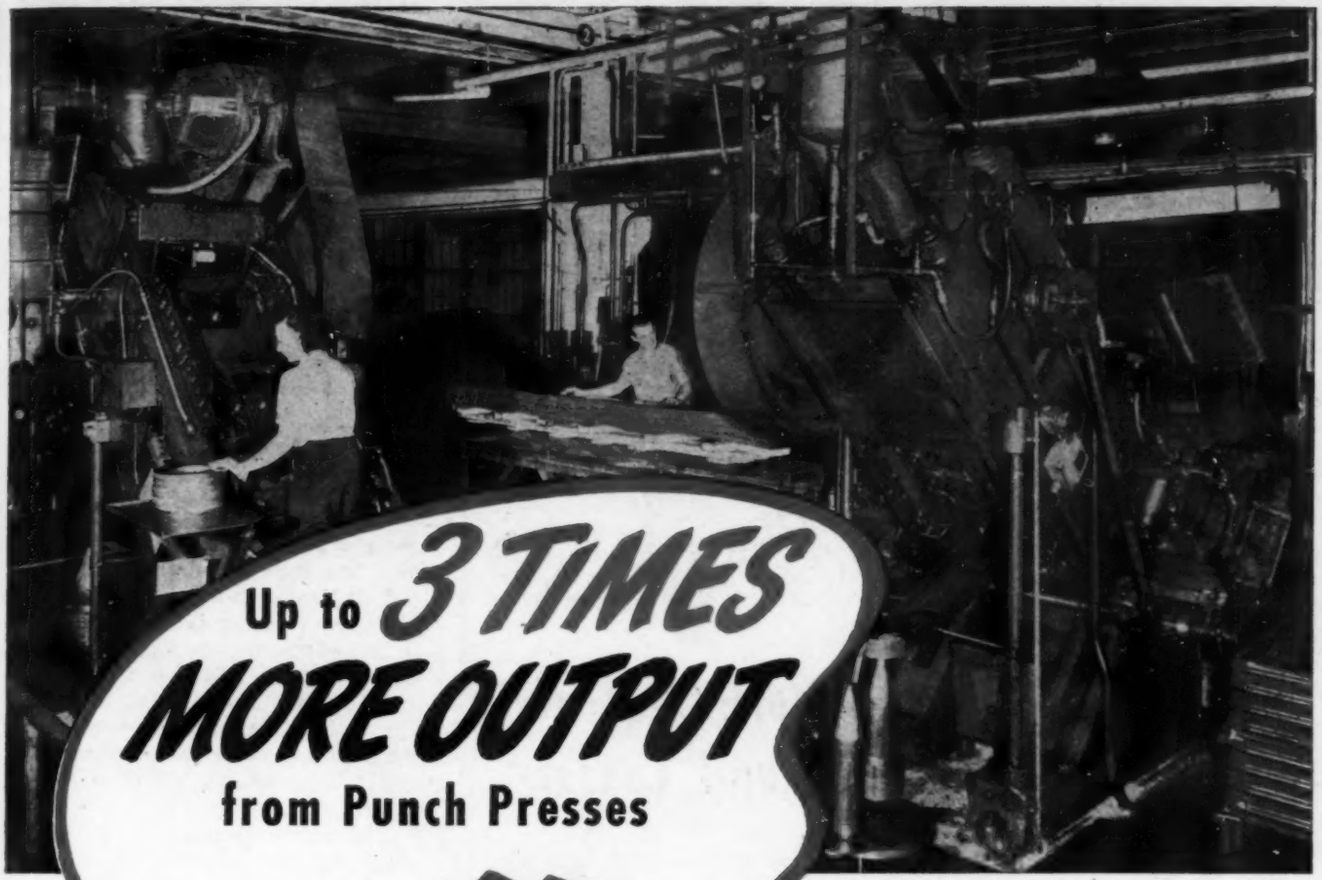
Reducing Regulating Valve Equipped with Pressure Gage

A combination reducing regulating valve and pressure gage is made by Dayton Rogers Mfg. Co., Minneapolis 7, Minn. It is made in four sizes: ¼, ⅜, ½ and ¾ in. pipe-size connections.

The valve reduces line or primary pressures to desired working (secondary) pressures, then maintains them as required on pneumatic tools. The gage records the pressure used on tools or apparatus. Each unit has two rubber shock-absorbing vibration dampeners to eliminate machine shock. Units can be used on all shop airlines and regulate pressure from 5 to 150 psi.

Carboloy Cemented-Carbide Rod In Specific and Random Lengths

Lengths of solid Carboloy cemented-carbide rod, unground and in both specific and random lengths, are available from Carboloy, Inc., Detroit 32, Mich. There are 15 standard stock diameters from 1/64 to ⅜ in. Stock allowance on the diameter is from 0.007 to 0.012 in. on the smallest size and from 0.022 to 0.050 in. on the largest size. Random lengths vary from 4 to 12 in., and they have sufficient extra stock to compensate for any rough ends. A slight extra charge is made per piece when cut to specified lengths up to 12 in.



Up to 3 TIMES MORE OUTPUT from Punch Presses

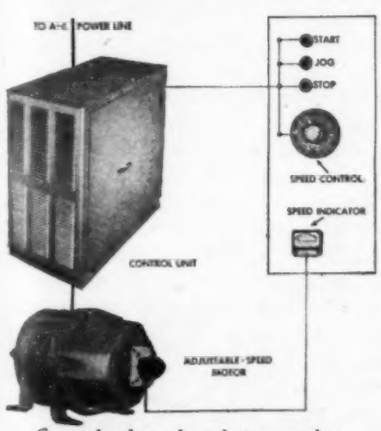
...with RELIANCE V★S DRIVE

With repeat-stroke operation, V★S makes possible 2 to 3 times greater production by providing adjustable speeds to suit a variety of materials and operating conditions.

Don't miss the Operating Exhibit of RELIANCE V★S DRIVE
SPACE 302-C
at the MACHINE TOOL BUILDERS SHOW
CHICAGO, SEPT. 17th THRU SEPT. 26th

Reliance V★S Drive makes it possible to adjust machine speed to assure maximum production at the turn of a rheostat knob. Quick, smooth starts and stops—inching speeds for setting up—and remote control are other V★S contributions to efficiency and safety in processing equipment.

V★S, the *All-electric, Adjustable-speed Drive operating from A-c. Circuits,* has a record of improving quantity and quality of production while lowering costs on *every* type of machine on which it has been used. We suggest you write today for reprint of article, "Variable-Speed Jumps Output" and Bulletin 311.



Conveniently-packaged, space-saving V★S Drives are available from 1 to 200 hp.

RELIANCE ELECTRIC & ENGINEERING CO.
1075 Ivanhoe Road • Cleveland 10, Ohio

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RELIANCE A-C D-C MOTORS
"Motor-Drive is More Than Power"

Take the "Paper-Work" out of Production Control and Costs!

How many different people copy and recopy essential data from your Shop Orders, Time or Transfer Tickets and other shop forms for control of Production, Costs, etc.? It usually adds up to a lot of expensive "paper-work" that's subject to the delays and mistakes of many hands and heads.

Whatever Control or combination of Controls you want—Machine Loading, Dispatching, Progress, Work-in-Process or Costs, for example—you can have it through McCaskey with less clerical work and no repetition. And your Controls will be visual, up-to-the-minute, prompt and dependable.

You simply visualize multiple copies of such records as Shop Orders, Time Tickets, etc. to eliminate rehandling and recopying operations. Whether two or a half dozen, they are written but once, all are available at once, and all are the same. No hidden records, no delays, no differences. "Paper" works for you instead of creating work.

The Production Manager in a plant with five hundred employees testifies about McCaskey Controls, for example: "We have a constant check of every phase of production, movement of materials, operations . . . have central and departmental control and job assignment, costs and material control *with a great saving of time and clerical work.*"

Write today for a copy of "The ABC's of Production Control" and other material suggesting how you can use McCaskey Methods profitably. Or better still, let us have a representative outline a plan for your particular needs.

McCaskey INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCaskey Systems Ltd., Galt, Canada — The McCaskey Register Co., Watford, England

ROUND TABLE *Discussion*

ARE TOOLMAKERS OBSOLESCENT?

Natural ability is a great asset, but it is surprising how far an honest determination will carry one along.

Toolmaking is at the top of the achievement list among those who busy themselves around machinery.

While the work of the all-around toolmaker is becoming more and more subdivided in special lines for individual workers, capable all-around workmen are the hardest to find and usually get the preference.

It is becoming more apparent that the best training is apprenticeship.

The apprentice may at the end of his course be classed not only as a capable workman, but he is in the most favorable position for a future foremanship or executive jog due to his general knowledge of manufacturing.

There are many fields of knowledge that are valuable assets to an executive position, but in the manufacturing line there is none of more value than a thorough knowledge of toolmaking.

Abel Blakeman
Watervliet, N. Y.

•

WHO PAYS FOR BREAKAGE?

The borrower of a tool should be responsible for its return in good order and should replace a tool lost from his custody. Borrowing without the owner's knowledge and consent cannot be defended or justified.

There should be no call for an operator to borrow a high-precision tool, such as a dial indicator, and there should be no cause for any employee to purchase such a tool. Dial indicators are machine equipment and, as such, along with mikes, straightedges, etc., should be included in the order when the machine tool is purchased; only thus can the full potentialities of a modern production unit be realized. When a new machine is contemplated, a careful survey of equipment needs should be made by the production executive and all tools deemed necessary to insure maximum utilization of the machine's capacity should be included in the specification.

The tool store should house all tools, a crib being allocated to each

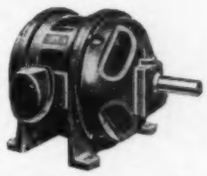
WHEELABRATOR NATIONALLY USED FOR NATIONALLY KNOWN PRODUCTS

The list of manufacturers, coast to coast, who depend on the Airless Wheelabrator for faster, more thorough cleaning of castings reads like a "Who's Who" of Industry. The varied types of castings cleaned covers practically the entire field of metal products.

Besides the "case histories" illustrated, Allis-Chalmers . . . General Electric . . . General Motors . . . International Harvester . . . Bendix . . . U. S. Steel . . . are but a few of the long list of progressive manufacturers using the Wheelabrator. Write today for full information on how the Airless Wheelabrator can be applied to your cleaning problems.

LODGE & SHIPLEY LATHES

Machine tool castings up to 420 pounds each are cleaned on a No. 3 Wheelabrator Multi-Table at Lodge & Shipley Machine Tool Co., Cincinnati. Although all castings are purchased outside they are Wheelabrated to insure a perfectly clean surface prior to machining and grinding.



WESTINGHOUSE ELECTRIC MOTORS

Motor frames, brackets, end plates and housings are just a few of the many types of castings which are Wheelabrated at Westinghouse Electric Co. Low operating costs and speed cleaning performance are reasons why Wheelabrators are chosen by Westinghouse for their cleaning requirements.

MACK TRUCKS

At the Mack Mfg. Corp., New Brunswick, N. J., two 48" x 72" Wheelabrator Tumblasts speed the cleaning of large and small truck castings. These castings consist of cylinder blocks, heads, transmission cases, water pump housings, etc. Cleaning time varies from 8 to 12 minutes depending upon the size and shape of pieces handled.

WHEELABRATOR TUMBLASTS
Eight standard sizes ranging from 1 cu. ft. to 63 cu. ft. capacity for cleaning loads in which individual pieces may vary from a fraction of an ounce to over 1,000 lbs. each.
WHEELABRATOR TABLES
Made in Plain Table and Multi-Rotary Table Types and in numerous standard sizes for cleaning flat or fragile work that is not adapted to tumbling.
WHEELABRATOR SPECIAL CABINETS
Cabinets are designed for special production requirements or where work cannot be adapted to a standard machine. Examples: cylinder blocks, bath tubs, crankshafts, etc.

MAYTAG WASHERS

Typical Maytag washer castings cleaned in Wheelabrator equipment at the Maytag Co., Newton, Iowa, include: wringer frames, locks, heads, and uncut gears. These parts are cleaned in a 27" x 36" Wheelabrator Tumblast in a fraction of the time formerly required with an airblast table and several barrels.

WRIGHT CYCLONE ENGINES

Wright cyclone aircraft engines that must be corrosion-proofed for sea duty are metallized. To obtain the correct bond for this operation the surfaces of the deep finned cylinders are Wheelabrated in specially designed machines. 93 Wheelabrators are in operation at their various plants.

Representatives in Principal Cities

American

WHEELABRATOR & EQUIPMENT CORP.
(Formerly American Foundry Equipment Co.)

317 S. Byrkit St.
Mishawaka 6, Indiana

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

DON'T GUESS! BE SURE WITH A LUFKIN RADIUS GAGE

Use it to check the radius of inside corners or fillets, outside corners, convex surfaces, cutting surfaces of formed milling cutters — there's no end to the number of jobs you can perform quickly and accurately with a Lufkin Radius Gage Set. Each blade in the set is a separate unit that can be easily applied to the work, and each carries both the inside and outside radius forms.

Lufkin Radius Gages are available in sets from 8 to 24 gages, with radii from 1/32" to 1", contained in a durable leatherette folder. Handle firmly holds individual gages for checking hard-to-reach surfaces. For the best in tools, order Lufkin. For the best in service, order Lufkin tools from your distributor. Catalog on request.

LUFKIN

THE LUFKIN RULE CO., SAGINAW, MICHIGAN, New York City

machine, and such equipment should be inspected and checked at regular intervals in order to safeguard the accuracy of the product.

The generous provision of high-grade working tools reduces the percentage of scrap due to faulty sizing, etc., to a point whereby the initial cost and day-to-day maintenance of machine equipment is wiped out.

An employer may be aware of, and take no exception to, the use of employee-owned tools in the shops, but that does not make him liable for their upkeep or make him responsible for replacement. One employer known to the writer insured at his own expense all employee-owned tools against loss or destruction; and this seemed to satisfy all concerned.

It is a great mistake to make borrowing easy for the borrower, and it is my experience that employee-owned precision tools are a menace to accuracy, unless they are regularly handed in for check and test.

C. D. Mackinnon
Airdrie, Scotland

•

WHY HELP THE DRUMMER?

Allowing tools to be displayed and sold during the firm's time or at any time on the firm's premises is unwise.

I have known firms to allow this, but it has always caused dissatisfaction among the men. Some men buy what they cannot afford, because they think that not buying will be frowned upon, but they often feel that the company, or someone in it, is getting a rakeoff.

In all towns there are dealers in small tools who depend for their prosperity on the mechanics in that town. They usually carry a wide range of goods and have experience in recommending the best tool for a job.

My experience is that a great many salesmen sell tools at the works that are not satisfactory, and are not to be relied on.

W. E. Warner
Essex, England

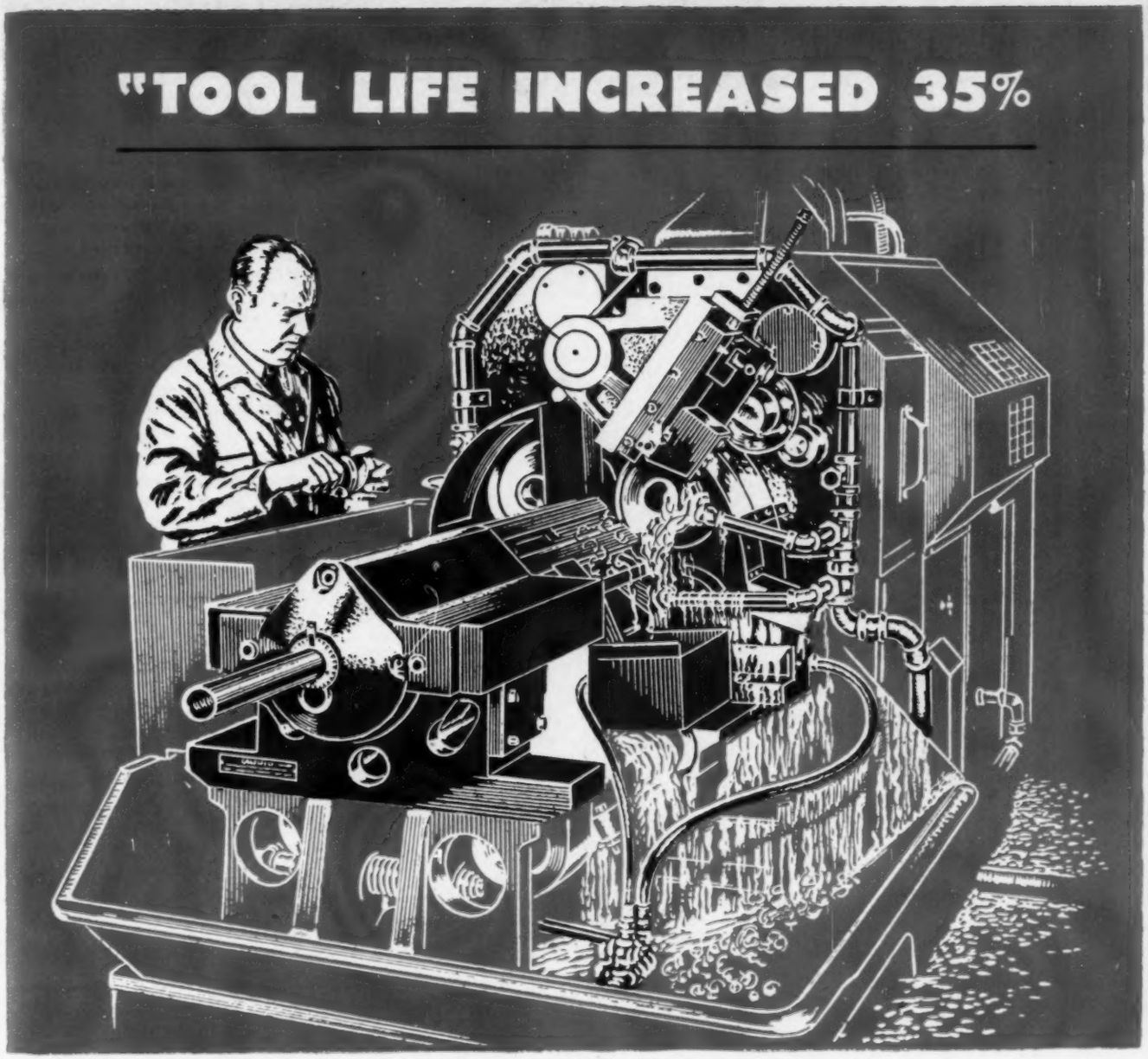
•

WHEEDLER OR NEEDLER?

Some men think out their jobs, prepare every step, are quick and skillful; others just jog along. To level the performances of the two types in an upward direction is sound policy, and a wise and competent expediter can do it.

Occasional men, when given special duties and authority, see themselves in the light of their authority

"TOOL LIFE INCREASED 35%



. . . when we switched to Tycol No. 675"

TYCOL
INDUSTRIAL LUBRICANTS

**Boston • Charlotte, N. C.
Chicago • Detroit
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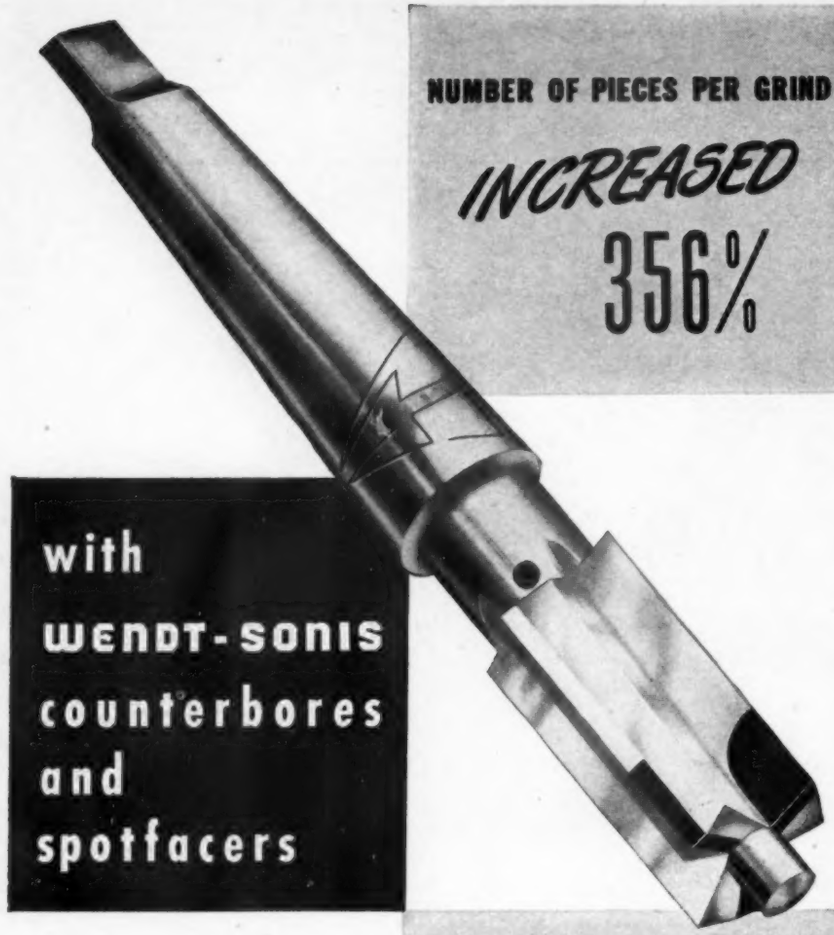
TIDE WATER ASSOCIATED OIL COMPANY
17 BATTERY PLACE NEW YORK 4, N. Y.

***"Chips no longer weld to tools..
Tool regrindings reduced...
Gum deposits eliminated...
No more trouble with rust..."***

These are a few advantages observed at one large plant using Tycol No. 675 Heavy Duty Cutting Oil. You, too, will find that Tycol No. 675's demonstrated superiority will help you increase production . . . cut costs . . . produce finer, tarnish-free finishes.

For complete data about Tycol No. 675 Heavy Duty Cutting Oil, phone your nearest Tide Water Associated Office . . . NOW.

LUBRICATION—"ENGINEERED TO FIT THE JOB"



NUMBER OF PIECES PER GRIND

INCREASED

356%

with WENDT-SONIS counterbores and spotfacers

Proof that this finer Wendt-Sonis Carbide Tool means more pieces per grind is found in this production data report. Better design eliminates chatter and gives a smoother finish. Straight flute design gives maximum performance on hard materials. Use Wendt-Sonis Carbide Tools to increase your production — combat high costs.

PRODUCTION DATA REPORT
COUNTERBORES

WORK PIECE: Hardened steel sleeve insert in a stationary engine . . . 40 to 42 Rockwell "C".

OPERATION: Counterbore — smooth finish.

COOLANT: Soluble oil and water.

MACHINE: Radial drill.

TOOLS: H.S.S. Counterbore. Wendt-Sonis Carbide Tipped Counterbore. (Straight flute design.) Tool TAC-21.

COMPARISON

	H.S.S.	WENDT-SONIS
SPEED:	160 r.p.m.	420 r.p.m.
FEED:	.002	.003
RESULTS:	16 pcs. per grind. 114 pcs. per tool average.	57 pcs. per grind. 721 pcs. per tool average.

FREE! WENDT-SONIS CATALOG No. 646 Contains latest data, sizes and prices. Write: Wendt-Sonis Co., Hannibal, Missouri and 580 North Prairie Ave., Hawthorne, Calif.; also Wendt-Sonis Chicago Warehouse, 1361 West Lake St., Chicago, Illinois.

WENDT SONIS

CARBIDE TIPPED CUTTING TOOLS

BORING TOOLS • CENTERS • COUNTERBORES • SPOTFACERS • CUT-OFF TOOLS • DRILLS • END MILLS • FLY CUTTERS • TOOL BITS • MILLING CUTTERS • REAMERS • ROLLER TURNING TOOLS • SPECIAL BITS

rather than of their knowledge, and assume that all men can be expedited. In one case a not-too-wise expediter tackled the quickest two men in the shop with the result that output was reduced.

The best attitude an expediter can adopt is that of friendly inquiry. As an example: A man was asked to do something he thought impossible. The expediter agreed that it was, apparently, difficult; however, he did make one or two suggestions pertaining to modifications of the tools, and went on his way. When the expediter returned, the modifications had been made—the job was no longer impossible.

The expediter who becomes a "needless" is clearly unfit for his job. By putting men's backs up, he obstructs rather than expedites.

J. E. Powell
England

•

WHO HIRES 'EM?

It is unlikely that all applicants for work would be able to meet the requirements of every job in any works. Questions of character, intelligence, cleanliness, sometimes physique, and technical experience, all have to be considered, and foremen have not the time to spare to interview and classify applicants to this extent. Much of this can be done by a non-technical man.

Although the judgment and discrimination of some foremen may vary within wide limits, the qualifications of personnel are subject to the same variations, only the feeling of responsibility for ultimate results is remote rather than direct. Often the applicant with common sense, ability, intelligence, or any kind of experience is "the foreman's job" to discover. Thus all that personnel's function amounts to in certain instances is that of selection without attempting to obtain suitable recruits. Then the foreman has to try out what are often times unpromising candidates.

There is a useful place for personnel to fill if they interview all applicants (seeking help by ads when necessary), take up references, and pass on likely men for selection by the foreman. If they did all the donkey work and left the technical and final considerations for the people competent to judge, and who were responsible for the success of the department, they would be rendering a real service, acceptable to the foreman and useful as well as profitable to the firm.

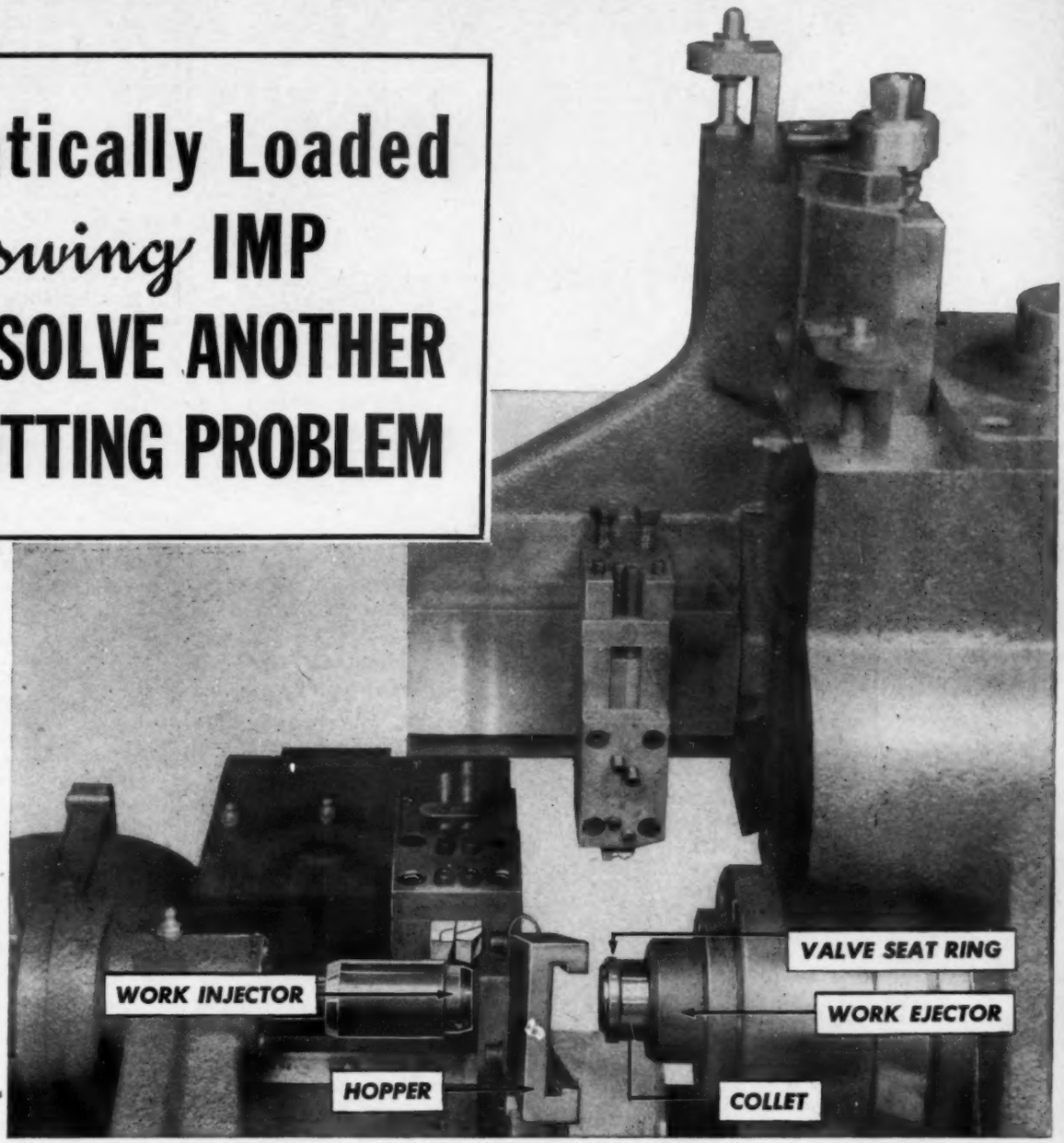
A logical point put forward by

MACHINE OF THE MONTH

EPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK

Automatically Loaded *Lo-swing* IMP LATHES SOLVE ANOTHER COST-CUTTING PROBLEM

1947 MACHINE TOOL SHOW CHICAGO SEPT 17-26



lem: To automatic- load and unload, h turn, finish turn hamfer the outside eter of Valve Seat s.

ion: The IMP Auto- c Lo-swing Lathe ed for this job was ped with the Seneca Falls Ram Type Loader used ssfully on many types of small parts with a substan- eduction in manufacturing costs.

are loaded in the hopper (shown in above illustra- and are automatically picked up and placed on the erated collet by the work injector.

carbide tools on the front carriage rough and finish the outside diameter while one edge is rounded and ther chamfered by two tools set on the vertical slide. ols then withdraw, pressure on the collet is released, he work ejector thrusts the finished piece into the ding chute.

ntire cycle is automatic; the spindle revolves contin- ...even during loading and unloading... thereby reducing starting and stopping fatigue on the motor, pulley, belts and other drive mechanisms.

The rough and finish boring operations on valve seat rings may also be handled automatically on the IMP Lathe with a different type of automatic loader. For this operation, the valve seat rings are held stationary in an automatic revolving loader and the boring tools are mounted in the revolving headstock spindle. This method avoids all distortion of the piece, which is clamped between the two faces instead of on the outside diameter.

Seneca Falls Engineers have vast experience in the successful designing of automatic loading equipment for all types of Lo-swing Lathes. Why not let them solve your cost cutting problems?

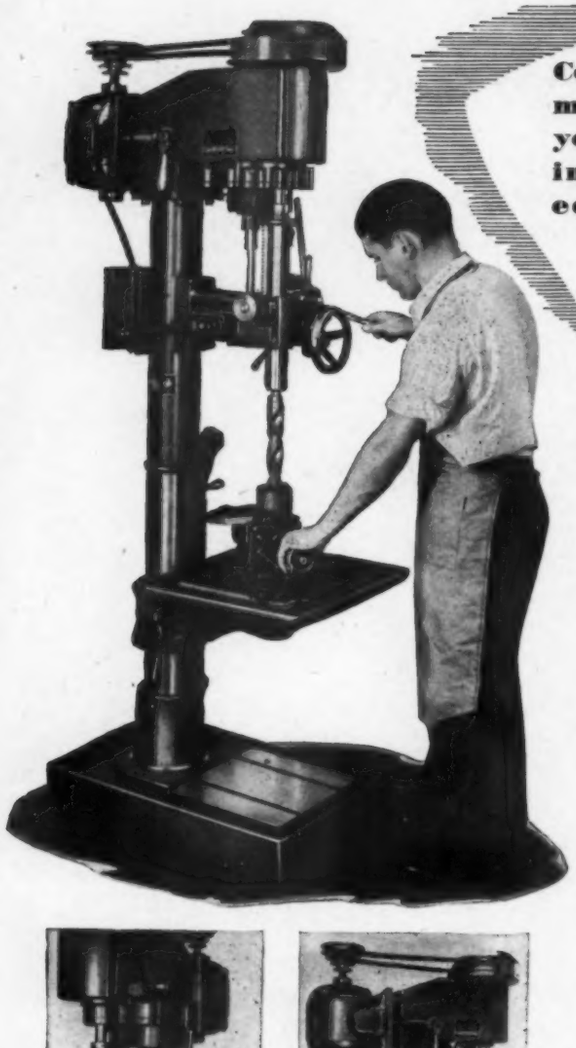
SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

RODUCTION COSTS ARE LOWER WITH *Lo-swing*

ABSORB WAGE INCREASES

With This New Model C-20

SIBLEY DRILLING MACHINE

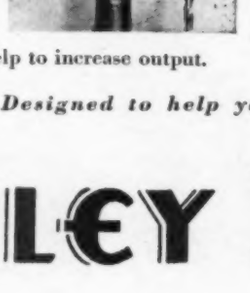


Compare time and motion studies on your present drilling and tapping equipment with the new 20" Sibley!

For operator efficiency, the new 20" Sibley is tops! Now introduced for the first time, it will cut your cost per piece on production; permit greater accuracy in your tool room.

Here is a shop machine designed by shop men. You have easy access to controls—turn a knob to select the proper geared power feed. A lever allows convenient shifting of V-belt. The 20" Sibley is a precision tool for sensitive drilling jobs at high speeds, and still has ample power to drill 1½" in mild steel. 8 spindle speeds range from 65 to 1360 RPM, driven by a 2 H.P. motor.

SEND FOR CATALOG NO. 67 NOW! Get complete information to compare with present equipment.



Convenient controls help to increase output.

Designed to help you challenge rising costs.

SIBLEY

MACHINE & FOUNDRY CORPORATION
25 E. TUTT STREET
SOUTH BEND 23, IND.

a foreman is that responsibility for the successful working of a department depends upon and involves choice of its personnel, and the recommendations of a foreman, if satisfactory where general works rules are concerned, should be accepted. This, of course, would place personnel in the role of a service department and not managerial.

J. E. Powell
Lincoln, England

•

WHOSE JOB IS LABOR RELATIONS?

On the premise that "one good turn deserves another," Al's advice to Ed, to spend a little time with his men on their problems, will ultimately lead to increased production. Labor relations of this nature should definitely be a part of the foreman's job.

The foreman who aids in ironing out most of the gripes of his men without involving labor relations and the front office is demonstrating his ability as a real supervisor.

"Hear your men out and attempt to settle the problems on the spot" should be a recognized activity within the foreman's jurisdiction. Nipping the potential grievances in the bud will keep a flood of minor complaints out of the "expert's" hands.

The place in an organization for the labor relations specialist should be as a court of last resort after the foreman and the employee have failed to reach an amicable solution of the grievance, or if the problem involved is one of contractual relations and outside the field of the foreman's activities.

Wm. E. Kaufman
Philadelphia, Pa.

•

SHOULD MEN BE SPECIALIZED?

Specialization is something more than keeping a man on one class of work so that he may become proficient thereon. To reap the greatest value from specialization, it is necessary to use each man on that class of work in which he excels, and so far as practicable keep him employed there.

In each works the abilities of the different men are shown by the results. To specialize without considering a man's aptitude may be to prepare square pegs for round holes, but once the natural bent of the individual man has been discovered, the policy to follow is obvious.

In one particular instance, a case of flattening steel side plates for large automatic guns in the interest

talk about

PUSH!

you're talking about

gerotor air cylinders

Gerotor double-acting, non-rotating Air Cylinders have all the "push" you need for efficient 150 p.s.i. air service.

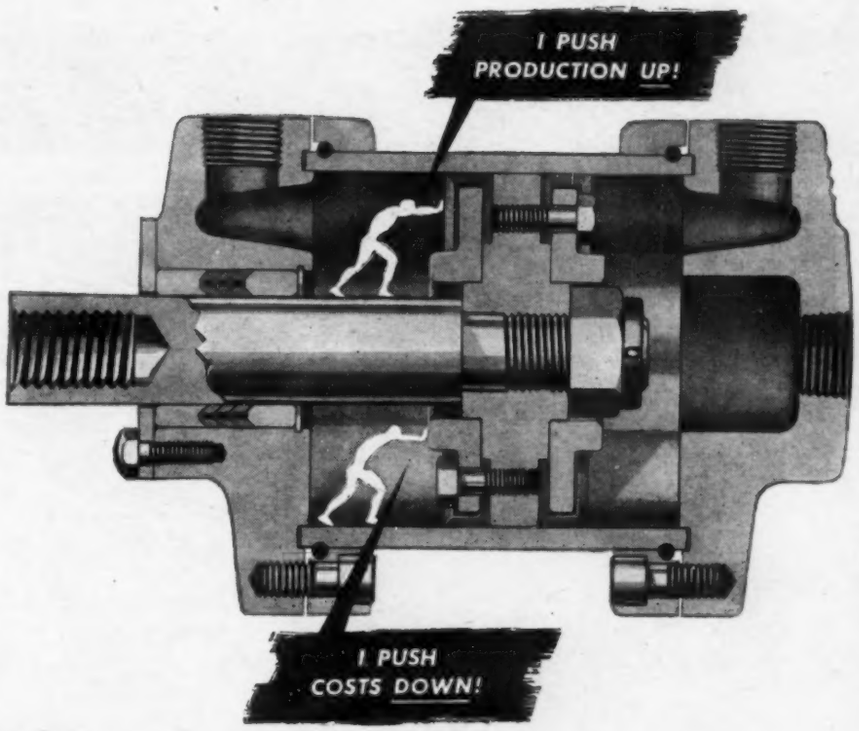
Available in seven standard mountings, nine bore diameters, strokes up to 96".

Features include:

(1) Self-adjusting composition rod packing.
(2) Ample bronze rod guide.
(3) Oversize alloy piston rod.
(4) Self-adjusting composition cup packing.
(5) Heavy-duty piston assembly.
(6) Piston rod and assembly firmly secured.
(7) Heavy-duty alloy covers.
(8) Large pipe connections rotatable to any position.
(9) Keeper ring design that eliminates tie rods.

Write for Catalog Section 52 . . . today!

GEROTOR MAY CORPORATION,
Baltimore 3, Maryland



GEROTOR air valves & cylinders

hydraulic pumps, pump units, motors, valves, cylinders

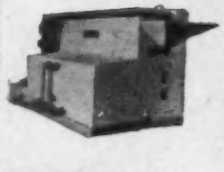
For DEGREASING • WASHING
RINSING • PICKLING and DRYING
of METAL PARTS

DEGREASERS
PICKLERS

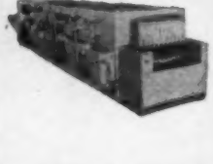
Standard and Special Types of equipment from the smallest to the largest sizes for a wide variety of metal degreasing, washing, cleaning, rinsing, pickling, drying and allied process operations.

Send for illustrated bulletin

OPTIMUS EQUIPMENT COMPANY
Engineers and Manufacturers
5 WATER STREET, MATAWAN, N. J.



WASHERS
DRYERS



OPTIMUS EQUIPMENT
FOR CLEANING · RINSING · DEGREASING · PICKLING AND DRYING OF METAL PARTS

TODAY'S *Exacting!* PRODUCTION DEMANDS

Require the

- *ACCURACY*
- *DEPENDABILITY*
- *VERSATILITY*

BUILT-INTO

SHAPE-RITE SHAPERS

You can depend upon the built-in accuracy and durability of Shape-Rite Shapers to withstand day-in and day-out capacity production. The speedy set up features and ease of operation will increase the output of precision work. Shape-Rite Shapers are Versatile, and will handle any type of work within the capacity of eight-inch stroke Shapers. Unexcelled for Tool and Die Makers and small instrument manufacturers. Complete specifications on request. *Write to Dept. A-17.*

Sales Service Machine Tool Co.
2363 UNIVERSITY AVE. ST. PAUL 4, MINNESOTA

of lightening weight, the surplus material between location faces was milled away. After this had been done in a roughing operation, a finishing operation for the final faces was performed. The removal of the material in roughing, however, relieved so many rolling stresses that, from the point of view of flatness, the plates were like the proverbial dog's hind leg. Man after man was tried, but each failed. Then an insignificant-looking man blew in and was given the job. The plates were quickly flattened. He had not seen the job before but had the knack, saw what was needed, and was able to do the job in a tenth of the time taken by the previous men. He was paid a special rate in recognition of the value of his special skill.

It is worth taking into consideration that a person's skill and ability are his stock-in-trade and the greater this is, the more valuable it is—so specialize the special gifts.

J. E. Powell
Lincoln, England

•

SHOULD THE BOSS GET TOUGH?

A boss usually gets tough as a result of being lax with his help, with a consequent breakdown in control.

Two necessary rules to abide by are to be just and firm with the men from the start; to analyze the men and work, giving work out to men according to their ability.

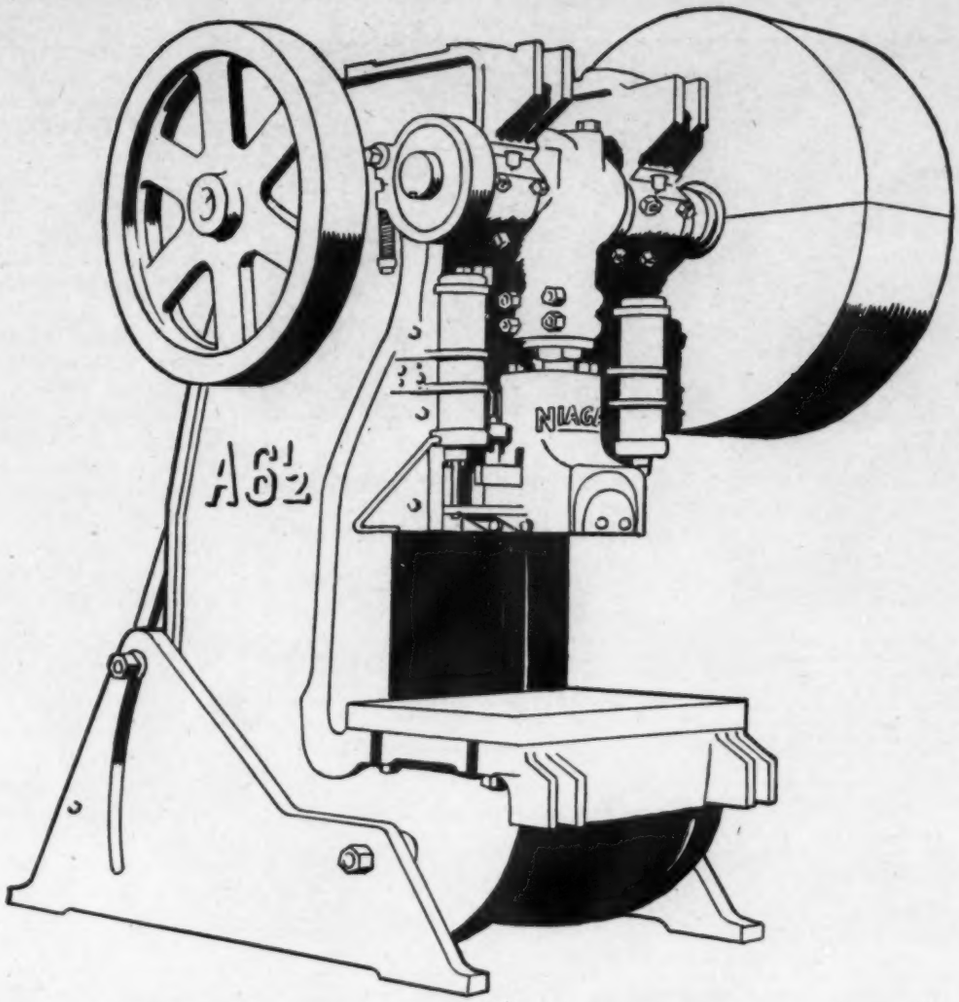
Watch the shiftless and clock watchers, possibly dismiss one or two, and the rest will respect you; then the plant will take on a certain 'care for itself' attitude. The men will know you are just, but won't stand for nonsense.

Henry Rasmussen
Niagara Falls, N. Y.

•

It is reasonable to assume that when the big boss makes his appearance in the plant, conditions are not normal. We will assume, for example, that the big boss is an individual who really gets tough on such occasions. In all probability his every move is broadcast via the grapevine, and when he enters the plant everyone is on his best behavior.

The boss may sometimes wonder why he cannot find a foreman in the department when he has something to complain about. The answer is that they have been notified of the boss's approach and have found it convenient to go to another department. Even the men at some of the machines will take time out to warn those about him of the movements of the "old man." That's losing pro-



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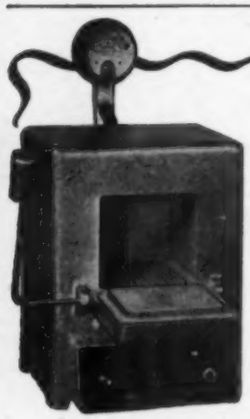

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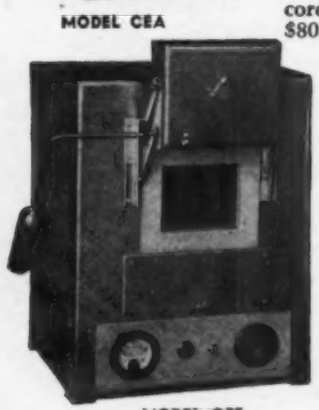
Model CEA is designed to give outstanding performance at low initial and operating costs. Has special high temperature heating element embedded in four sides of muffle lining for protection and uniform heating. Built with TEMCO stepless control which permits operator to select and hold any temperature from 500° to 2000° F. Maintains even temperature regardless of normal changes in line voltage. Heating chamber 4¾"x4¼"x6". Max. input 1.5 kwh. Insulated cast-aluminum body. Supplied with attachment cord ready to plug in and operate. For 115 V. AC $80.00; 230 V. AC $85.00. *Also available for DC.*



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duction, but the boss doesn't see it.

The man who happens to get the bawling out will resent it. Even if he "has it coming," he resents the fact that he was made the goat under the eyes and ears of those he supervises, or works with. The rest of the day the company stands to lose money on his services.

The big boss who has the quality of giving his orders with firmness and without raising his voice in public, will receive much greater cooperation. He will find his foremen and supervisors ready and willing to discuss any problem—and even to accept a legitimate bawling out when given at the proper time and place.

The big boss who gets tough is using a whip, and will find by careful observation that the use of the whip will cause the victim either to "sit down—or back up."

A. F. Scoblic
Milwaukee, Wis.

•

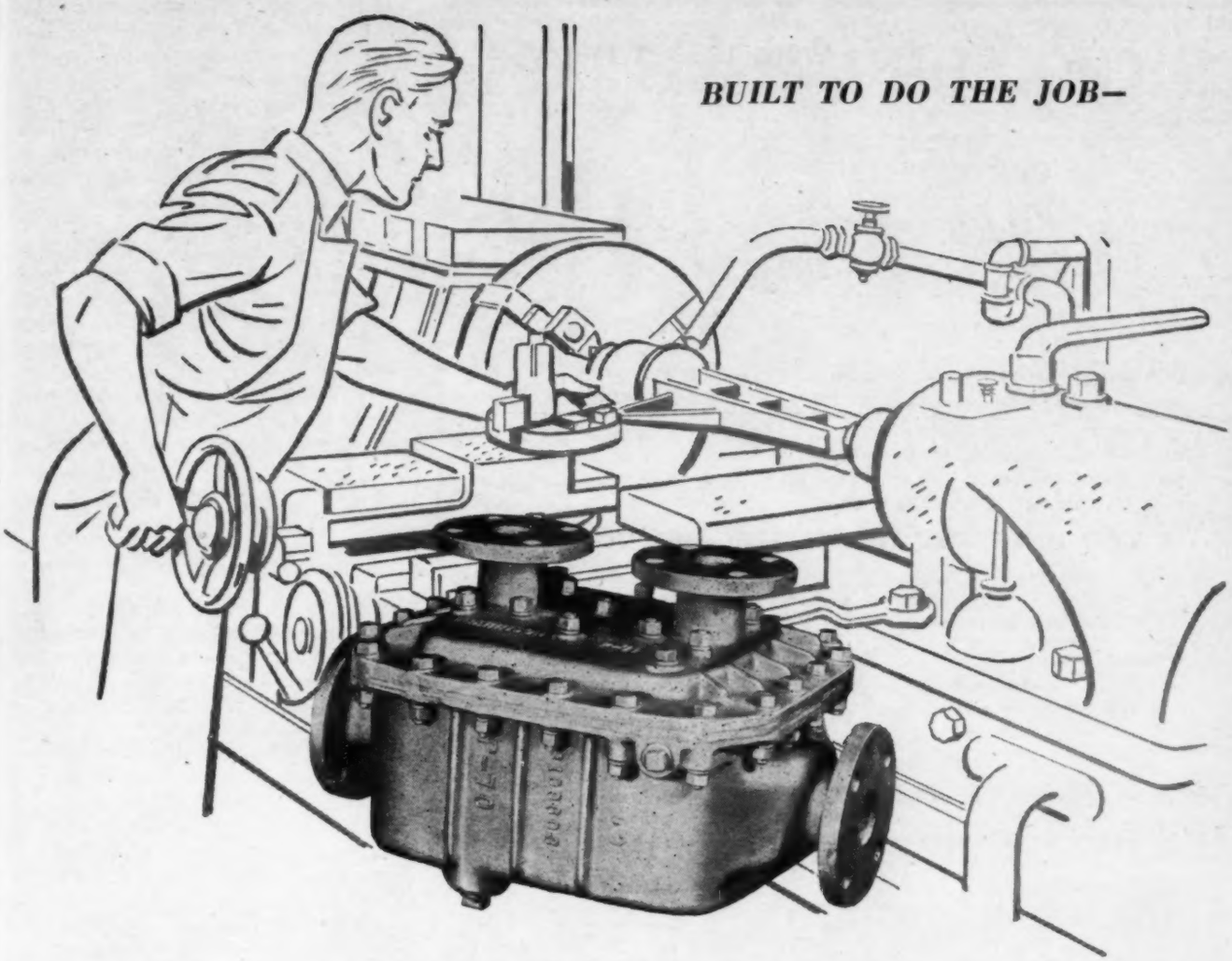
The Boss who thinks he must show toughness occasionally, as well as the one who has a temperament at trying times, are both usually of a temperament that at other times leads them to an apologetic mood. This causes those under their charge to feel uncertain of just where they do stand—in other words, they are not very sure of themselves when they make decisions.

The Boss who is more deliberate in decisions and more even-tempered is credited with a greater degree of consideration and gets better results. The man in charge who is honest and fair in his decisions and willing and ready to acknowledge a mistake made by either himself or one in his charge is the one who will gain and maintain the greatest respect. He will as well be giving the best service to his employer.

Martin H. Ball
Watervliet, N. Y.

•

Management's idea of the "Big Boss" has changed just as much as equipment has changed through the years. Up to about 1900 the type of boss favored by management was the hard-boiled variety. I worked for one boss whose vocabulary would have made a piker of a barge captain, but he was a hard worker and had the esteem of the fellows he supervised, because he could and did put them right when they were in doubt on how to proceed with a job, and would pitch in and help. The men in the plant were on their toes all the time because he was aways around himself. That type of



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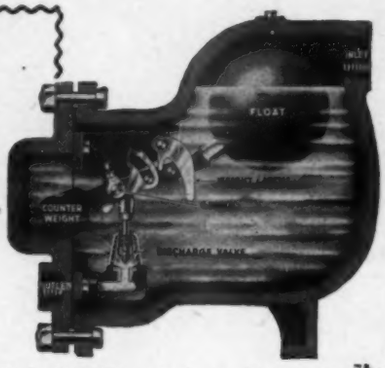

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boss is more or less obsolete nowadays.

Present qualifications for a boss are that he have a good personality, be a top-notch engineer, have a record as a producer and the ability to lead and get along with people, a thorough knowledge of the incentive system, and an even temperament. The preferred age is 35-45.

Management doesn't want a driver. it has provided the best equipment to ensure greatest efficiency and output, and the man serving as superintendent must be capable of creating and maintaining teamwork. He will have to get tough occasionally, as his job demands, but in the case of serious offenses, the main office will deal with the culprit.

Arthur Silvester
Niantic, Conn.

•

SHOULD YOU MOVE MEN UP OR IN?

No hard-and-fast rule can profitably be laid down for placing men in key positions, although length of service should have first consideration in making promotions.

Every man, regardless of his degree of ability, can do some particular job better than another, and it is to the advantage to place his employees, as well as applicants, where each can produce the best results.

When an applicant and a present employee have equal capabilities for an opening, the present employee should always have the preference. However, when the applicant holds the highest grade, he should be the choice.

Costly mistakes have been made by managements who have felt their organization so progressive and up to date that nothing could be gained by looking for improvements outside, only to find out too late that competitors have some kinks that could be used to advantage in other organizations.

Abel Blakeman
Watervliet, N. Y.

•

Men should be moved up if possible, although circumstances may prevent it sometimes. A specialist may be needed on a new machine, and no one available is qualified to fill the vacancy.

Normally, men should be moved up because it is an incentive to mechanics, and promotes good morale in the shop.

A responsible senior employee is likely to take more interest in and care of a new piece of machinery. In my experience, I saw one new

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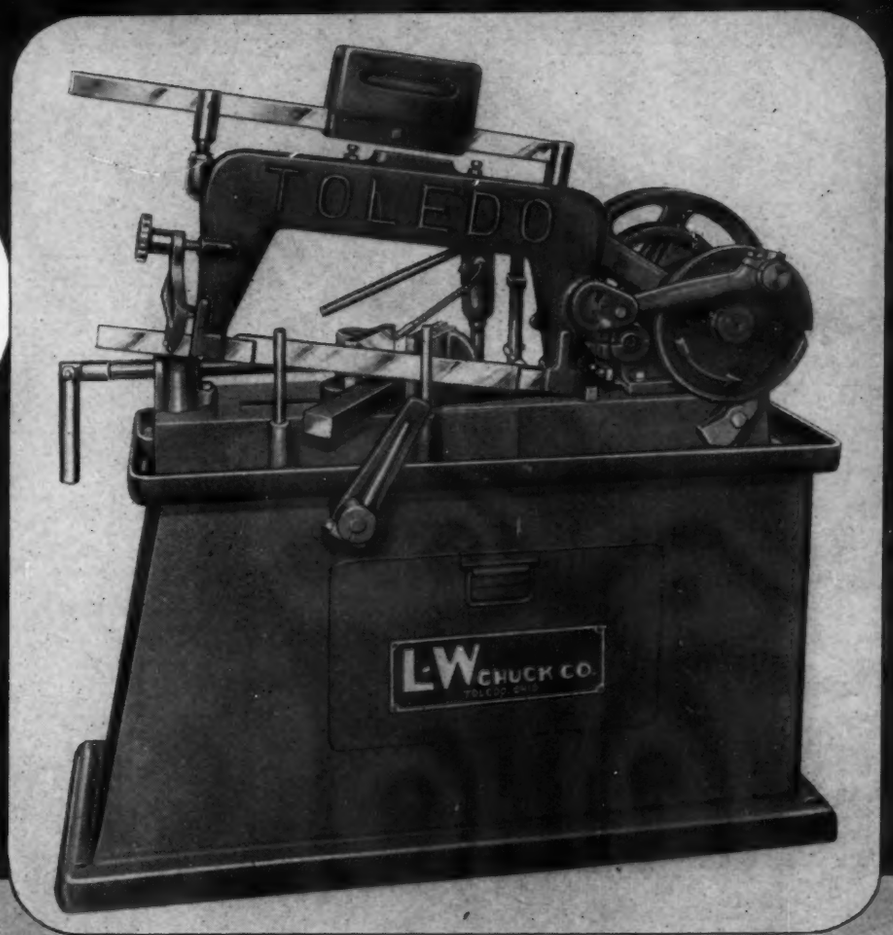

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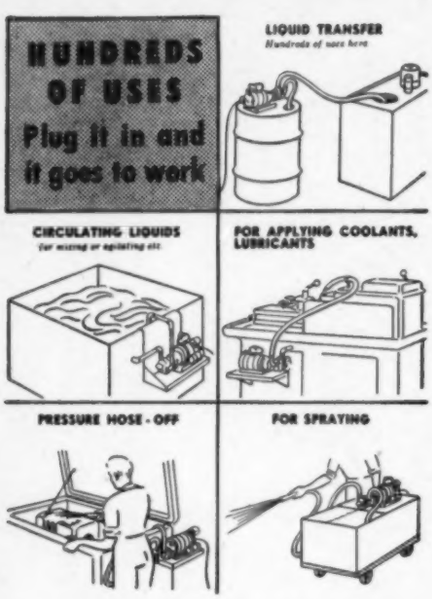

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man bore into the spindle of a new lathe, and another bore through a new radial-drill table. There is no reason to give new men the newest machine in a shop. At the same time, we must be reasonable and not relegate the new man to the poorest machines in a shop. But, in all fairness, if we consign a man to a particular new machine, it should go to older shop men, if they are capable.

Henry Rasmussen
Niagara Falls, N. Y.

•

Al's idea of getting an expert to set up and run the new screw machine is sound, because an expert would get the new machine running and producing before the toolmaker could become thoroughly familiar with its construction.

Not only that, but there are kinks and short cuts that only an expert would be familiar with on a screw machine. This type of machine is different from the regular run of machine tools and must be understood to enable an operator to get maximum capacity.

The expert running a screw machine will produce twice the amount of work that an unfamiliar operator could, at less cost. Of course, if Ed had a toolmaker in the shop who had previous experience on the new machine, he would be the logical man for the job.

The concern from which the machine was bought would send a demonstrator, if requested; the usual method when a new machine is bought. However, the introduction, occasionally, of two or three capable new men keeps regular employees on their toes, plus the fact that new ideas are brought in to help increase production.

Arthur Silvester
Niantic, Conn.

•

GOLDBERGING OR GOLDBRICKING?

A properly organized suggestion system will never become an alibi for Goldbrickers. The major trouble with suggestion systems that have sprung up in the past several years is the lack of proper planning before being put into effect.

In order to carry out a suggestion system properly, all details must be clearly established. The policy or type of suggestions wanted must be stated, the rate of pay established, and the method of acceptance of the suggestions outlined in published form for all employees.

The value of suggestions received

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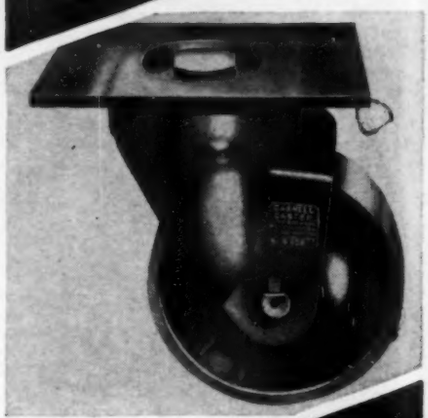

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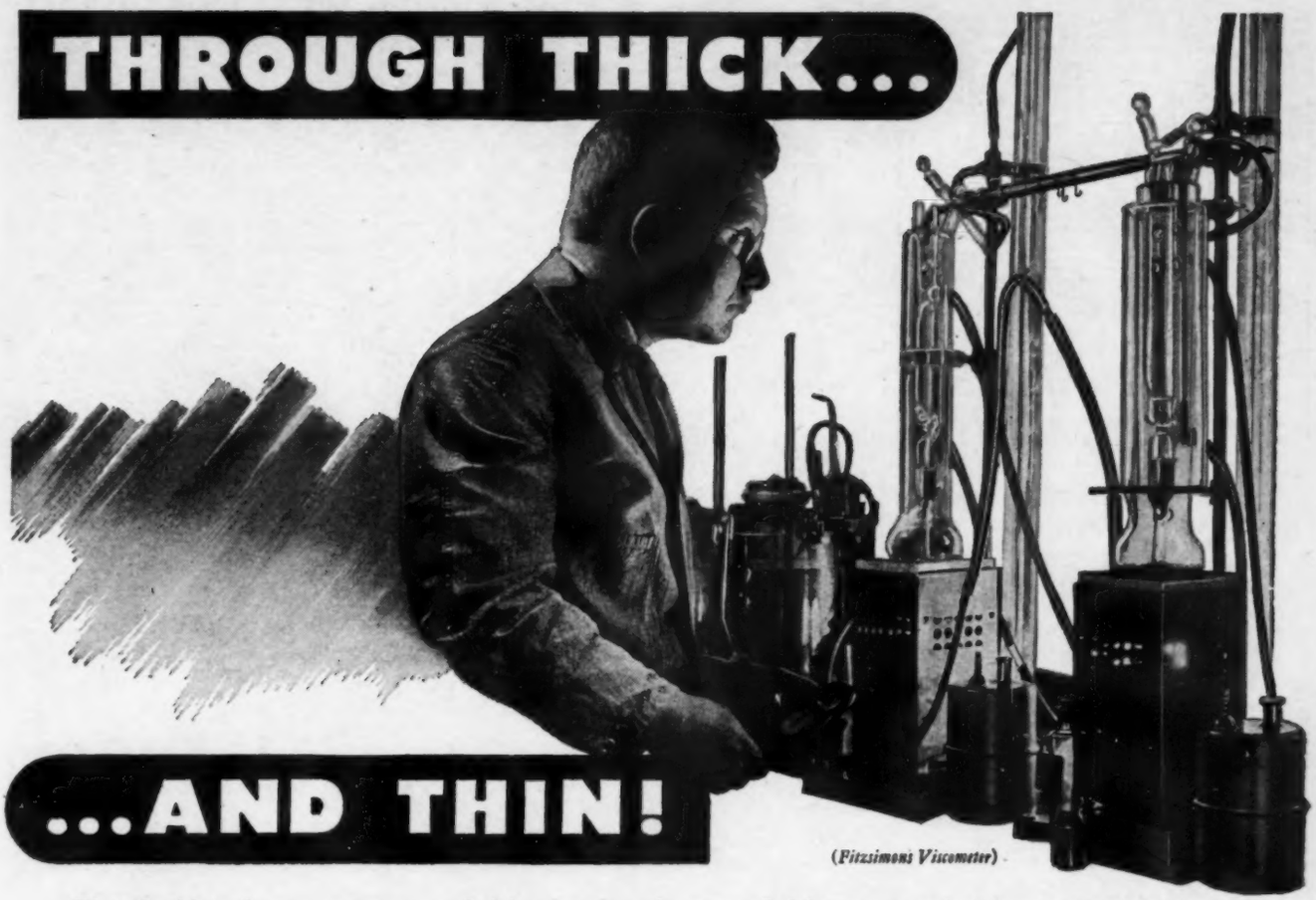

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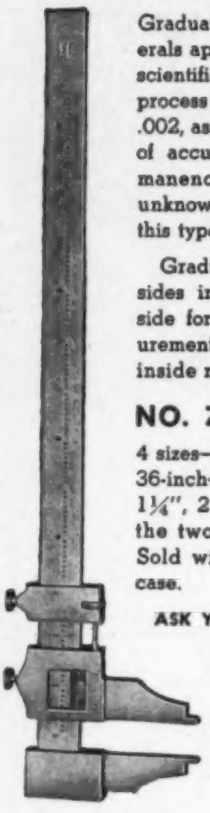

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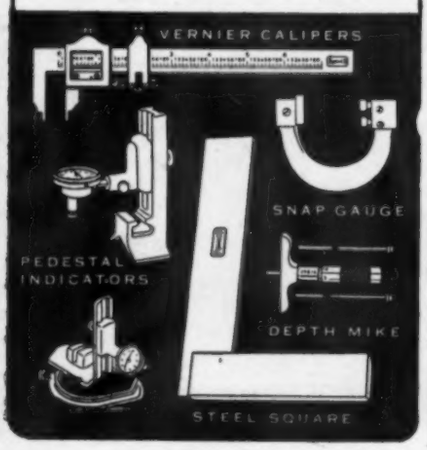

from any group of employees can be of considerable value in reducing manufacturing costs, creating more pleasant working conditions, and assisting to build company morale.

The employee working on the actual job can find short cuts that the most capable methods, process or tool engineer would miss by a casual inspection of an operation or a quick tour of the plant. One must live with a job to learn its intricacies and the means of establishing qualified shortcuts in performance or execution of the job.

In plants where successful employee suggestion systems are in operation, very little time is spent by the employees on actually working out the suggestion on company time. Most companies have supervision and enough work to keep their employees busy for the forty hours they put in each week.

Engineers are often consulted as to the workability of a suggestion. This may require the use of "paperwork" or tryouts or models, or a similar method to verify the workability of the employee suggestion. Therefore, it is not necessary or desirable for the employee himself to attempt to work out the suggestion on company time.

Supervision should, however, encourage an employee to work out any of his own ideas after hours should the employee desire to submit all details of his suggestion rather than a brief of what he desires to see accomplished.

Charles D. Townsend
Centralia, Mo.

NEW BOOKS

WELDING SYMBOLS—*By Vincent C. Gourley. Published by The Bruce Publishing Company, Milwaukee, Wis. 114 pages. Price $2.50.*

Standards and symbols explained are those recognized by the American Welding Society and have been simplified and reduced to the least possible number. In explaining the general standards for arc- and gas-welding symbols, as well as resistance welding symbols the author covers all points with clear illustrations. Drawings specify the weld or welds in the same manner as a mechanical blueprint while the explanation interprets the drawing and shows pictorially the exact location and outline of the welds.

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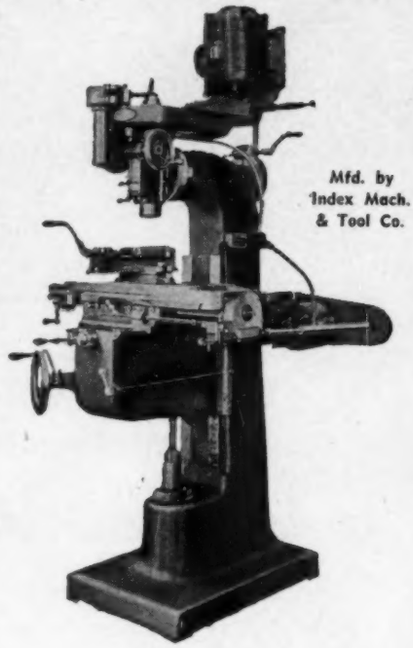
will help you on your tool, die and production work. In addition to micrometer dials on screws, verniers are standard equipment for cross and longitudinal locating. If finer precision is desired, rods and indicators are available. These in conjunction with power feed to a precision ball bearing spindle make a very versatile machine for milling, drilling and boring. ***Literature promptly mailed on request.***



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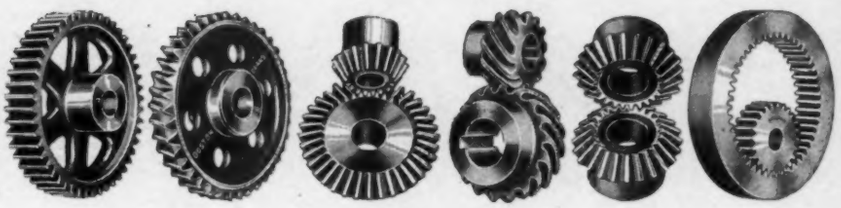

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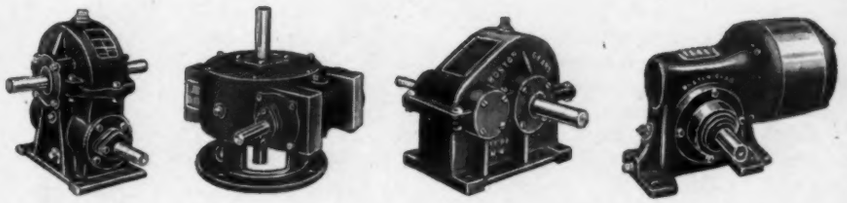
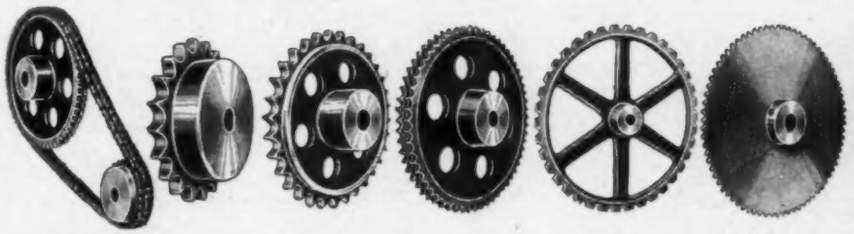
Made-to-order gear housings and lubricating problems are eliminated when you select a modern speed reducer — a completely engineered and inclosed gear box ready for installation. The Boston Catalog lists 20 different speed reducer types and also gives you valuable data to use in the selection of the right unit for your drive.



SPROCKETS & CHAIN

For more flexibility in a positive drive, sprockets and chain may be your answer. Long center distances are a primary feature. Stock sprockets are listed in the Boston Catalog if your drive is from "flea" power up to 40 horsepower. For your information complete specifications and selection data are given in the Boston Catalog.



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J. P. Tomlinson

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both letters and figures, used in conjunction with an arrow supply all the information necessary for completing any welded joint and is in effect a simplified shorthand system.

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FINISHES FOR ALUMINUM—*Published by Reynolds Metals Co., Dept. 27, 2500 S. Third St., Louisville 1, Ky. Section 1, 108 pages; Section 2, 120 pages. Price for both, $2.*

The first volume discusses the characteristics and applications of many different types of finishes. It includes 8 cleaning treatments, 17 mechanical surface finishes, 15 chemical surface finishes, 11 electrolytic oxide treatments, 12 electroplated coatings, 7 paint application methods, 7 paint coatings, various ceramic coatings and special finishes. The volume concludes with a discussion of controls and tests for finishes.

The second volume is for shop use. It is bound in a loose-leaf binder and revised bulletins will be issued periodically to keep it up-to-date. Thirty of the most common finishing processes are covered in this volume with details on materials and equipment, the preparation of solutions, operating procedure and controls given for each.

•

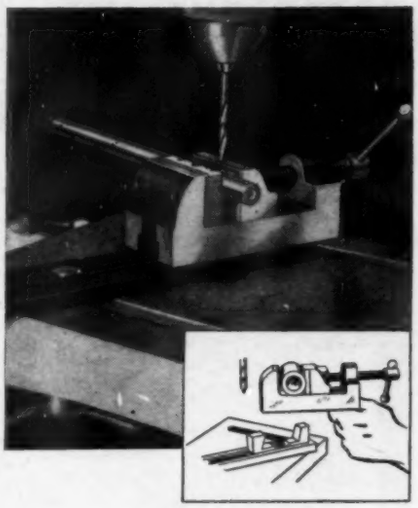
MANAGEMENT AND HUMAN RELATIONS IN INDUSTRY—*Vol. I of The Labor & Industrial Relations Yearbook and Directory. Edited by Paul Anderson. Published by Industrial Relations Publishing Corp., 1165 Broadway, New York 1, N. Y. 103 pages. Price $2.*

This book is a symposium of 25 articles, many by men famed in industrial-relations work. Among them are James F. Lincoln and A. F. Davis of Lincoln Electric Co., Whiting Williams, Walter N. Polakov, William Seaver and Charles H. Ingersoll.

Many phases of industrial-relation management are covered, including incentive and collective bargaining, as well as a general range of topics from hunger and famine to taxes. Typical of the articles is "Fallacies Responsible for Industrial Strife," wherein Willford I. King, Economics-Professor Emeritus, New York University, attacks ignorance of economic laws and exposes misconceptions that lead to trouble.

Mr. King ranks high among these fallacies the beliefs that raising wage rates increases the nation's total purchasing power and that labor, by producing too much, may work itself out of a job.

"YANKEE" VISE and Vise Clamp



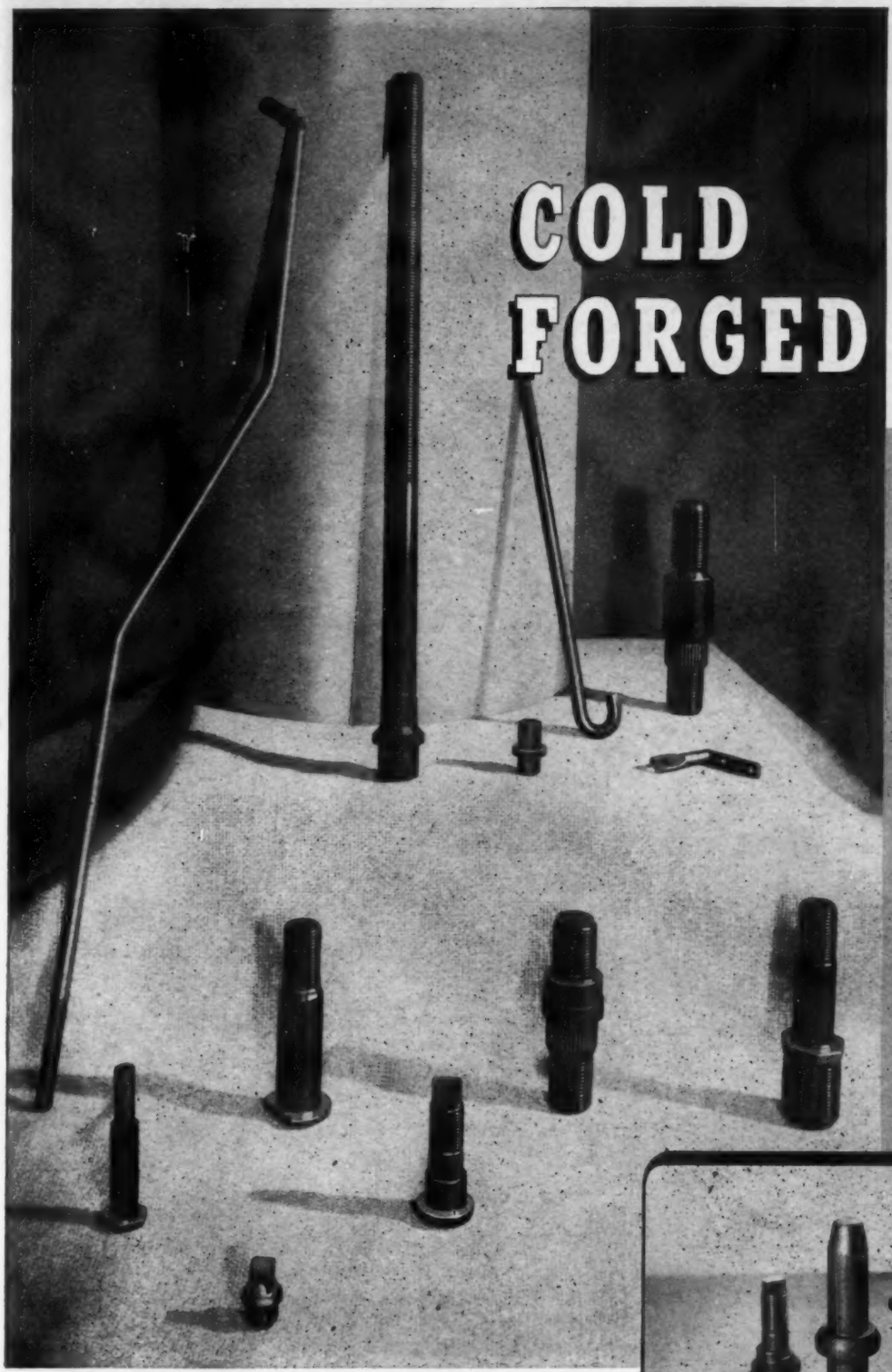
short cut set-ups

Just one set-up securely aligned and held in a "Yankee" Vise. Lift it off swivel base on bench and set it on "Yankee" Vise Clamp on face plate of drill press. Sides, bottom and front end accurately machined. Grooved V-block for gripping rounds and irregular shapes. Sturdy, accurate tool for keeping jobs simple and easy. Your industrial distributor likes to sell "Yankee" Tools because they're "willing tools" that make friends. No. 1993 "Yankee" Vise and No. 2993 "Yankee" Vise Clamp illustrated.

Write today for illustrated "Yankee" Tool Book.

YANKEE TOOLS NOW PART OF STANLEY THE TOOL BOX OF THE WORLD

NORTH BROS. MFG. CO.
Philadelphia 33, Pa.



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Allied's experience in producing cold forged parts is your guarantee of:

- High volume production at low cost
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- Strength and durability
- "On time" delivery

Quotations figured from your part prints will be submitted promptly.

ALLIED CORPORATION PRODUCTS — PRECISION · EXPERIENCE · DEPENDABILITY

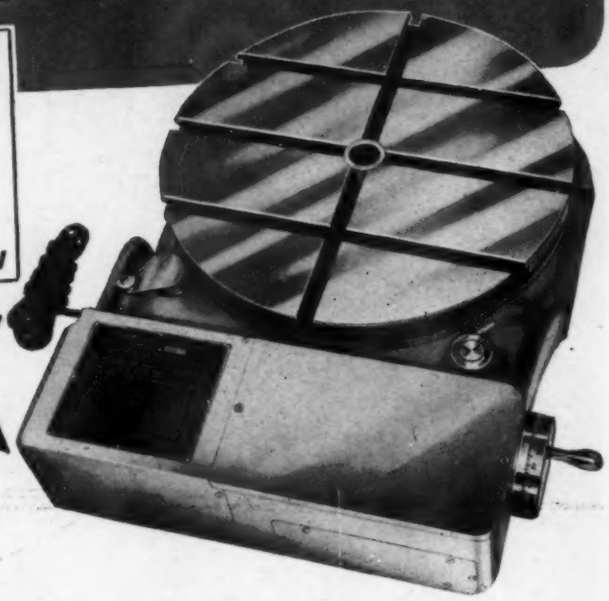
ALLIED PRODUCTS CORPORATION
DEPARTMENT 35

SPECIAL COLD FORGED PARTS • STANDARD CAP SCREWS • HARDENED AND PRECISION GROUND PARTS
SHEET METAL DIES FROM THE LARGEST TO THE SMALLEST • JIGS • FIXTURES • STEAM-HEATED PLASTIC MOLDS
SPECIAL PRODUCTION TOOLS • R-B INTERCHANGEABLE PUNCHES AND DIES • DIE MAKERS SUPPLIES

DON'T MISS THEM AT THE SHOW!

1947 MACHINE TOOL SHOW CHICAGO SEPT 17-26

KNIGHT'S 20" ROTARY TABLE



★ A self-contained motor-driven unit
★ Adapts any milling machine for rotary milling and indexing
★ Just plug it in — it's ready for work immediately
★ Eliminates all set-up time and special equipment
★ Use it as an automatic revolving fixture

KNIGHT'S No. 50 VERTICAL MILLING & PRECISION BORING MACHINE

★ Incorporates all the advantages of a solid base precision boring machine and rigid vertical milling machine
★ Combines plenty of power with unusual capacity
★ Simple and fast in operation
★ Adaptable to an exceptionally wide range of jobs

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Send NOW for Complete Details

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MORE GOODS for MORE PEOPLE at LOWER COST

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STYLE MM—FOR MULTIPLE SPINDLE AUTOMATICS, ETC., WHERE DIE HEAD ROTATES
STYLE DMS—FOR TURRET LATHES
One Set
OF LOW PRICE, HIGH QUALITY
H & G INSERT CHASERS
Fits
ALL THESE
H&G
Insert Chaser
DIE HEADS
The
EASTERN MACHINE SCREW
Corporation
Manufacturers of
• H & G Die Heads
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NEW HAVEN 6
CONNECTICUT
SOLID ADJUSTABLE STYLES
See these
SPECIAL PURPOSE DIE HEADS
at Chicago
STYLE SMM — for chucking machines such as Goss and DeLeeuw
STYLE DMT — for taper pipe threading on Brown & Sharpe
STYLE TMM — for taper pipe threading on multiple spindle automatics
STYLE TM — for superior quality taper pipe (with chamfer and reaming tool when required)
and H & G Threading Machines
See you at Chicago!
BOOTH 160

CUT YOUR LABOR COSTS . . .

by replacing heavyweight tools for driving up to No. 14 wood screws and ¼" nuts . . .

NEW Thor Lightweight Electric

The popular assembly line suspension type tool with greatly reduced weight for faster operation on continuous production. Three speeds —500, 750 and 1,000 r.p.m. Positive or adjustable slip clutch. Optional attachment for right angle driving.

Attachments, bits and socket wrenches are interchangeable.

Screwdrivers

The lightest hand-held tool in the heavy duty class—fashioned after famous **Thor** midget-type drills. Three speeds—500, 750 and 1,000 r.p.m. Positive or adjustable slip clutch. Optional attachments for 25-degree and right angle driving.

Call your Thor Distributor for a demonstration.

Thor PORTABLE POWER TOOLS

INDEPENDENT PNEUMATIC TOOL CO., 600 W. JACKSON BLVD., CHICAGO

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NEW

SUNICUT

with PETROFAC*

contains no animal or vegetable fatty oils

The latest achievement of Sun's program of continuous research in the field of metal-working lubricants is an entirely new series of Sunicut cutting oils. These new oils, retaining the Sunicut name and the numeral designations of the grades they replace, contain a unique polar compound of petroleum origin. Called Petrofac, this product of Sun research, in combination with the other ingredients of the new Sunicut grades, imparts metal-wetting, chip anti-weld and extreme pressure characteristics unsurpassed by anything previously achieved. Petrofac is the most recent development in the field of all-petroleum metal-working compounds, in which Sun has pioneered since 1920.

In announcing these improved grades of Sunicut, Sun Oil Company wishes to thank the large number of companies in all branches of the metal-working industry that tested them extensively under practical working conditions.

No Variation in Quality. In the compounding of cutting oils, the use of lard oils, or other oils of animal or vegetable origin, has long been standard among leading manufacturers. Such

* PETROFAC is a trade-mark of Sun Oil Company

oils impart many desirable characteristics. Unfortunately, because the sources of animal or vegetable oils are numerous and not under control of the cutting oil manufacturers, variations in quality have been inevitable, especially during recurrent periods of shortage. To eliminate its dependence upon such a variable product, Sun Oil Company embarked upon its search for an all-petroleum substitute for animal and vegetable oils. The resultant product, Petrofac, is made entirely from petroleum. Sun controls its qualities from the crude through every stage of the exclusive process by which it is manufactured.

No Sudden Price Changes. Another disadvantage of dependence upon animal or vegetable oils is the frequency with which the supplies and prices of such oils fluctuate. The recent advance in the price of lard oil from $0.90 to more than $2.25 a gallon is typical of the kind of fluctuations from which Petrofac will free the users of Sunicut cutting oils.

Can't Turn Rancid. The improved grades of Sunicut contain no animal or vegetable fatty oils. Because Petrofac, which replaces the previously used lard oils, is completely of petroleum origin, it cannot support skin-irritating bacterial growth, cannot turn rancid, even with prolonged use. Petrofac is actually germicidal in action.

Finer Finishes and Longer Tool Life. The new grades of Sunicut are giving even finer finishes than were possible with the old grades. This is true on both high speed automatic operations and extremely heavy operations. Many users of the new Sunicut grades are reporting increased tool life, as well. The superior metal-wetting properties of the new grades of Sunicut containing this unique polar compound—together with their high lubricating, extreme pressure and chip anti-weld characteristics—account for these better results.

Extensively Tested. Over 125 different combinations of ingredients were tested in Sun's laboratories before the present Sunicut grades with Petrofac were released for extensive field testing under controlled conditions on every type of machine tool. Now many thousands of barrels of the new grades of Sunicut have been used by industry. From every user we get reports of performance equal to, or better than, that of the famous old grades of Sunicut.

For further information about the performance of the new Sunicut grades phone your nearest Sun office or write Department AM-8.

SUNOCO

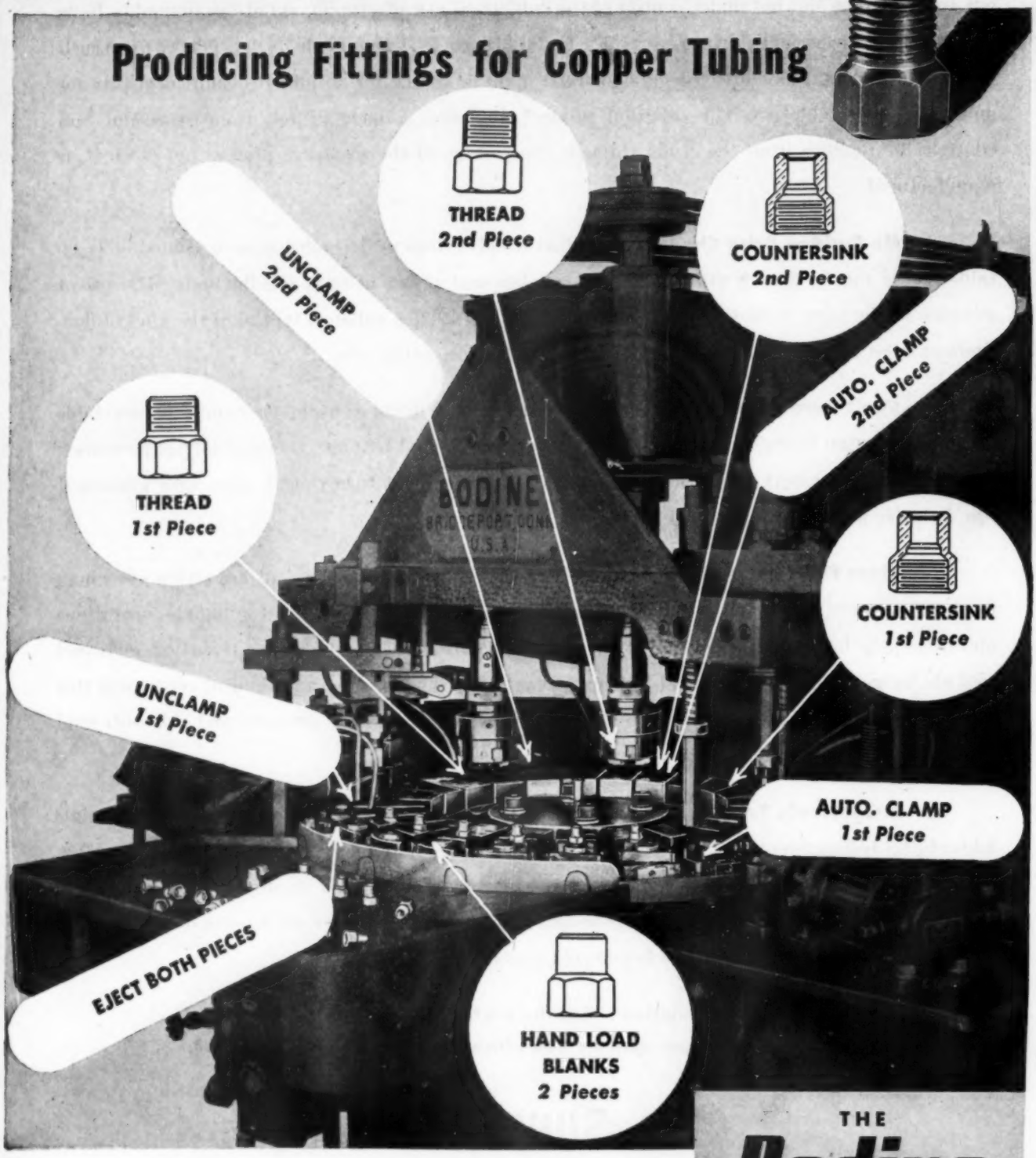
SUN OIL COMPANY

Philadelphia 3, Pa.

In Canada: Sun Oil Company, Ltd., Toronto and Montreal

Bodine ..Case History No. 21

Producing Fittings for Copper Tubing



Blanks produced on Screw Machines (or Bodines) from forgings or castings. This No. 42-30 machine produces secondary operations as indicated. Sizes to ¾" pipe . . . 2500 to 3000 per hour, dependent on size and material.

THE Bodine CORPORATION
BRIDGEPORT CONNECTICUT

AUTOMATIC DIAL TYPE DRILLING, MILLING, TAPPING, AND SCREW INSERTING MACHINES

See Bodine Machines under power at National Machine Tool Show, Chicago, Sept. 17-26. Booth 633.

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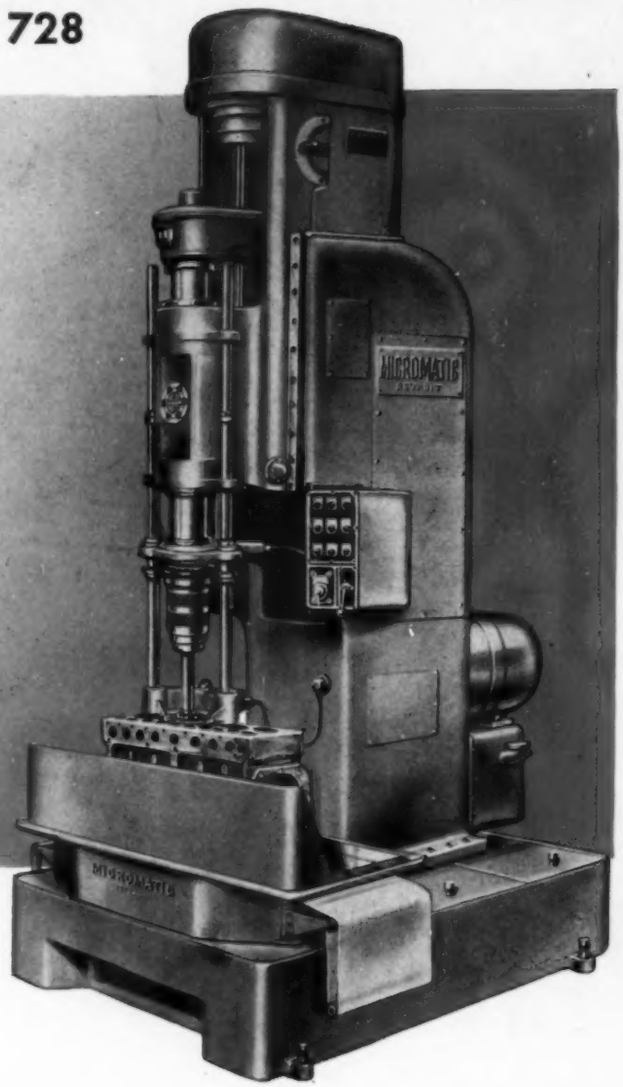
GREATEST SHOW ON EARTH

Again—in the center of Progress—AVEY presents to you the latest, finest, highest quality line of Sensitive Drilling Equipment you've ever seen.

Avey DRILLING MACHINES
CINCINNATI, OHIO

New MICROMATIC QUILL-TYPE HIGH PRODUCTION HYDROHONERS

MODELS 723, 724 and 728



THESE new spindle-in-quill, unit constructed, hydraulically actuated, heavy duty Hydrohoner machines are designed for Microhoning bores from ¼ in. to 4 in. in diameter, in lengths from ⅛ in. to 9 in. in high production. When equipped with the latest electronic MICROSIZE control, uniform size is automatically and dependably generated within 0.0001 in. to 0.0003 in.

Important advantages are gained by the spindle being in the quill: torque and thrust are taken about the centerline of the spindle—guide bars are unnecessary—alignment is assured—the weight of machine parts reciprocated in stroking is substantially reduced—reciprocating speeds may be increased without added power input.

By combining spindle rotation speed control, stroke control, hydraulic control panel, and MICRODIAL mechanisms in the head unit, all mechanical linkages, hydraulic pipe and fittings, usually required are eliminated.

All electrical equipment is located for most convenient service and maintenance.

Specifications

Model	723	724	728
Work capacity, dia.	¼—1"	¾—2"	1½—4"
length	¼—6"	¼—8"	¼—9"
Overall height x width x length	110x44½x60½"	127x44½x60½"	127x44½x60½"
Base at floor, width x length	44½x60½"	44½x60½"	44½x60½"
Spindle reciprocation stroke	0—7⅛"	0—⅜"	
Quill stroke	10	12	12
Clearance—spindle to column	10	10	10
Spindle nose to pads, max.	46	48	48
Hydraulic oil capacity	25	25	25
Coolant tank capacity	60	60	60

See this and eight other new model Microhoning machines at National Machine Tool Builders' Show, Chicago, September 17-26, 1947.

BOOTH 323

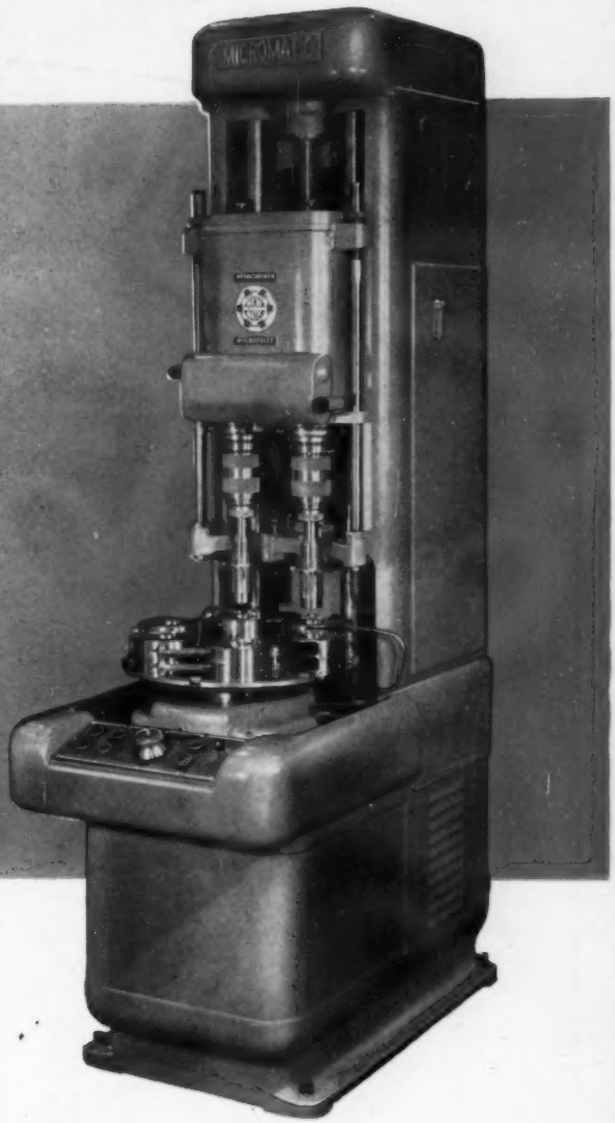
Microhoning Machines, Microhoning Tools, Microhoning Fixtures, and Microhoning Abrasives **MICROMATIC**

DISTRICT FIELD OFFICES: 1323 S. Santa Fe, Los Angeles 21, California. Phone: Tucker 3756 • 194 Dalhousie St., Brantford, Ontario, Canada. Phone: Brantford 1128 • 616 Empire Bldg., 206

MICROMATIC

New MULTI-SPINDLE HIGH PRODUCTION HYDROHONERS

MODELS 705 and 710



DESIGNED for automatically controlled, high production Microhoning of bores from ¼ in. to 2 in. in diameter, from ⅛ in. to 5 in. long, these machines may be used either for complete multiple Microhoning of two or three pieces at a time, or for progressive Microhoning of bores in two or three successive operations in the same work chucking. Combined with the latest developments in abrasive grading controls, substantially more stock is removed per unit of time, with production in average installations running 250 to 350 pieces per hour.

With either two or three spindles mounted in one head, an automatic six-station indexing fixture reduces the number of times the work must be handled and the travel time between progressive Microhoning operations. With electronic MICROSIZE control, inspection for size may be reduced to a few spot checks each shift.

This machine is especially adaptable for the finish processing of such high production parts as automotive con rod, gear blank and bearing race bores.

Specifications

Model	705	710
Work capacity dia.	¼ to 1¼"	½ to 2"
" " length	⅛ to 6"	⅛ to 6"
Spindle reciprocation stroke	0 to 7⅛"	0 to 7⅛"
" head stroke	10"	10"
Overall height	88"	100"
" width	30"	30"
" length	56"	56"
Spindle center to center	6½"	8"
Hydraulic tank capacity	30 gal.	30 gal.
Coolant tank capacity	40 gal.	40 gal.

MICRO MATIC TRADE MARK REGISTERED

HONE CORPORATION 8100 SCHOOLCRAFT AVENUE DETROIT 4, MICHIGAN

So. Main St., Rockford, Ill. Phone: Forest 1128 • 927A—M & M Bldg., P. O. Box 981, Houston 2, Texas. Phone: Preston 2381 • Room 514—129 Church St., New Haven 10, Conn. Phone: New Haven 7-0035

here it is!
... the tough little subject of all this
For Sharpening Carbide Face Mills
How to Determine Metal-I
CARBIDE MILLS ALUMINUM ALLOYS
Carbide Tool
MACHINE TOOLS FOR CARBIDES...I
Case Studies—10-Step Setup Pro
Production Methods Aid Carbide Control
How to Set Up
CARBIDE MILLING JOBS

Almost diamond-hard, fabulously productive . . carbides are pacing Metalworking to its greatest achievements yet

Metalworking gets its news on carbides' latest applications FIRST in American Machinist

When the Metalworking Industries can get all they need of what you and other suppliers make . . . when all production bars are down for keeps . . . then is *really* the time to watch cemented carbides go to work. For in these tough and rugged spearheads to quantity production, Metalworking has an answer with which to meet history's biggest peacetime demand for its products.

Carbide tools can cut and machine as much as 15 times faster than any other metal. They stay sharp longer, cut deeper. Dies made from cemented carbides punch and stamp relentlessly for thousands of extra hours. And throughout Metalworking, machines have been redesigned to take the brakes from carbides' ability to do the work. Faster machine tools, more powerful drives, accelerated production lines and schedules . . . these and many more advances all along the line have kept pace with carbide developments.

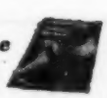
It isn't every day that Metalworking gets a chance to put a new production weapon like carbides to work. But when such a chance does appear, Metalworking knows about it and what to do with it.

American Machinist is one big reason why Metalworking does know. Ever since carbides were first announced this No. 1 magazine of metalworking production has reported on every new advance in carbides and their use. On the opposite page is *American Machinist's* coverage of this subject since January of last year alone. It is an impressive picture of the kind of alert and original help that draws to this magazine Metalworking's largest and most influential production-management audience.*

It's a story salesminded advertisers ought to know more about. And the *American Machinist* representative in your nearest McGraw-Hill office will welcome the chance to go over with *you* all the reasons why this magazine draws the largest advertising investment entrusted to any metalworking magazine.

***Net-paid circulation over 28,000.**
Many times this number of influential readers.

GOOD advertising in Metalworking's No. 1 magazine



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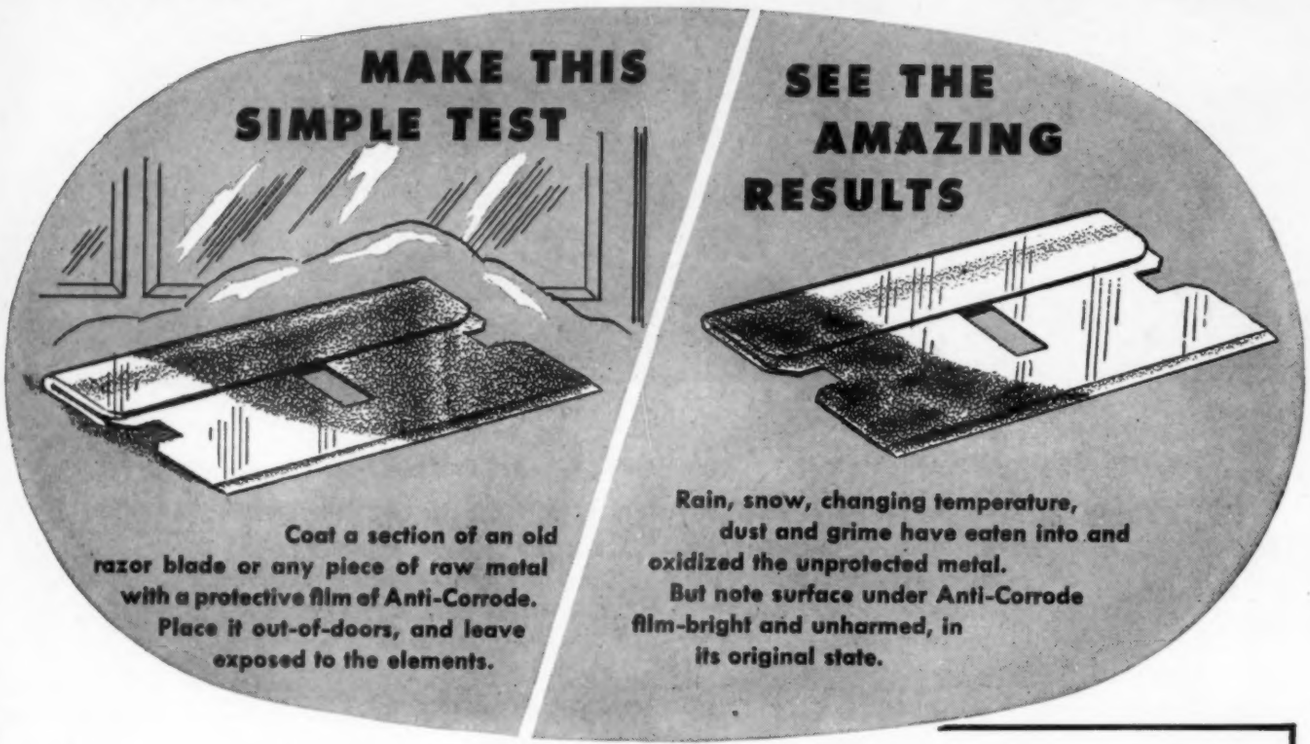
The McGraw-Hill Magazine of Metalworking Production
330 West 42nd Street, New York 18, N. Y.

How to PREVENT Corrosion


MAKE THIS SIMPLE TEST
Coat a section of an old razor blade or any piece of raw metal with a protective film of Anti-Corrode. Place it out-of-doors, and leave exposed to the elements.
SEE THE AMAZING RESULTS
Rain, snow, changing temperature, dust and grime have eaten into and oxidized the unprotected metal. But note surface under Anti-Corrode film-bright and unharmed, in its original state.

Cities Service Anti-Corrodes are safe rust and corrosion preventives that bring amazing results. They are reliable safeguards against corrosion of metals in any form or state of finish—whether in storage or in transit. These Anti-Corrodes form a tenacious, durable film that is impervious to moisture and the more common gases prevalent in the atmosphere. And, since they contain lubricating material, they need not be removed in drawing operations. These Anti-Corrodes are made in several types to meet a wide range of service conditions. They are economical, easy to apply and can be removed with kerosene or any petroleum solvent.

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OF MACHINED PRODUCTS!

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Structure Controlled

Annealed COLD FINISHED STEELS

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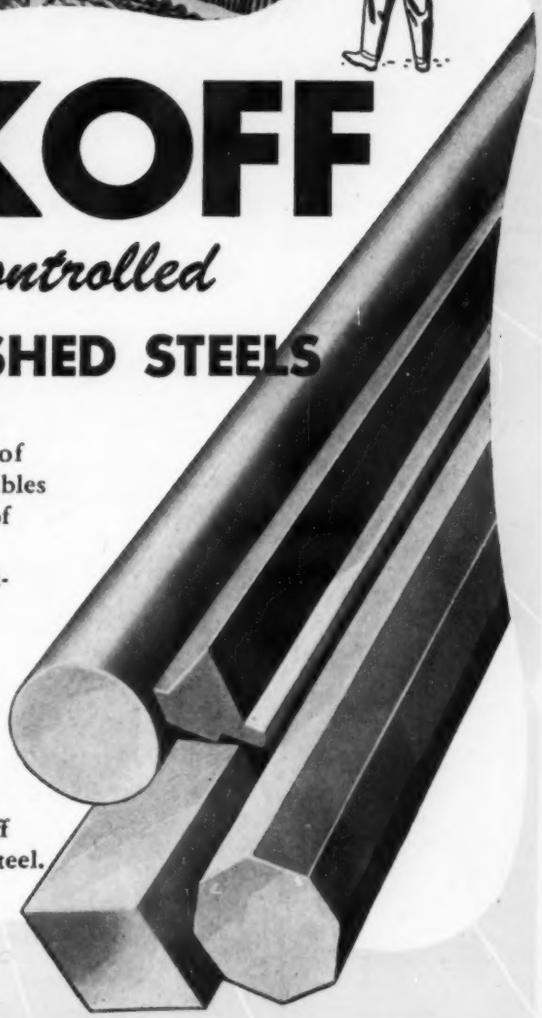
Wyckoff Structure Controlled Annealing uniformly produces the required structure for maximum machining efficiency. Whether that structure is spheroidized or pearlitic, it will be reproduced in every lot with the high fidelity necessary to eliminate structure as a variable.

If the cost of machining medium or high carbon steel is causing you concern try Wyckoff Structure Controlled Annealed Cold Finished Steel.



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Controlled CARBON and ALLOY

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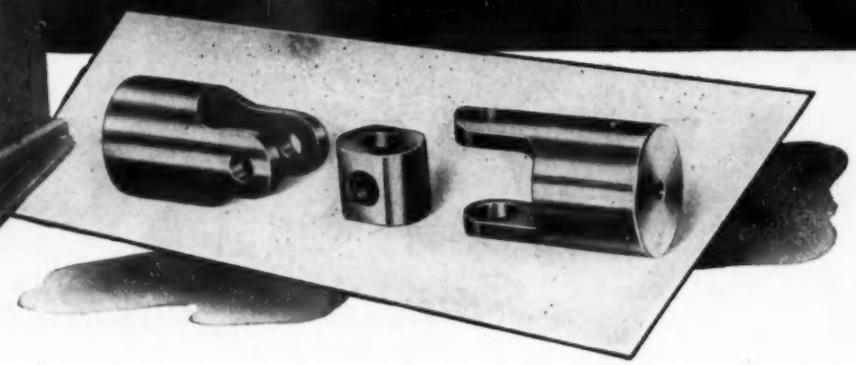
SUNNEN

Production Honing

on Curtis Universal Joints Assures Smooth Operation, Maximum Life, Trouble-free Service



Typical Jobs

Hydraulic Two-Way Control Valve. Hole is honed to eliminate leakage.

Drawing and Blanking Die "Saves time in producing smooth base metal finish."

Compressor Yoke. Alignment maintained and better finish produced.

Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.

Shell Loading Die.

Like hundreds of other manufacturers, Curtis Universal Joint Co., Inc., uses the Sunnen Precision Honing Machine to provide smooth accurate surfaces that increase the life of production parts. This machine enables Curtis to "precision fit" tandem, as well as single holes as shown in the illustrations above. Close tolerances and full bearing surfaces produced by Sunnen honing means that Curtis Universal Joints have an unusually free, easy action.

The Sunnen Precision Honing Machine hones every internal diameter from .120″ to 2.625″ in steel, cast iron, aluminum, bronze, carbide, plastic, ceramic or glass.

Accuracy is guaranteed within .0001″ — and a complete range of stones is available to produce any micro-inch finish desired. In hardened steel a finish of 2 to 3 micro-inches can be obtained.

The Sunnen Precision Honing Machine operates without jigs or fixtures — can be set up to operate in less than one minute — corrects errors of out-of-round and taper — does not require skilled labor — is easy to operate and low in cost.

Find out how you can use Sunnen Precision Honing in *your* plant. Write today for literature — or ask that a Sunnen engineer show you its advantages.

SUNNEN

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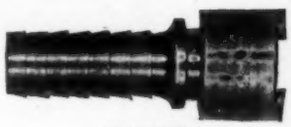
From 1/8" thread—1/4" hose up to 1½" thread—1½" hose.

Style SR



Style HF

BOWES "TYPE A" QUICK ACTING COUPLINGS
Hose ends from 3/8" to 1"; threaded ends, 1/4" to 1".

PRESSURE-SEATED AIR VALVES
Available in 6 styles. Style PO—SR.

Style PO

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HIGH PRESSURE (VACUUM) COUPLINGS
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REPORT № 4

. . . They said, "It couldn't be done."

that is – until they tried

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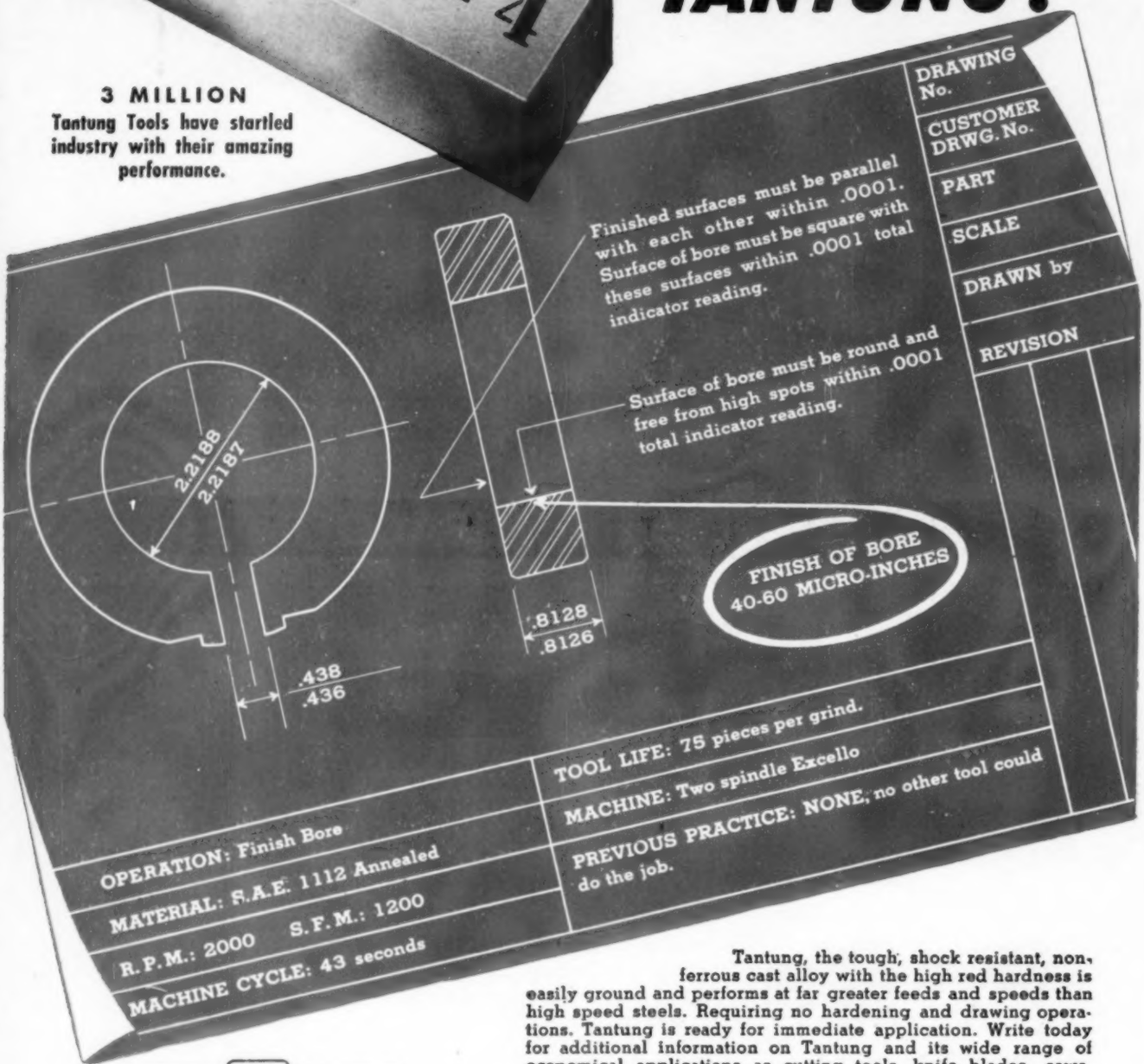
3 MILLION
Tantung Tools have startled industry with their amazing performance.


DRAWING No.
CUSTOMER DRWG. No.
PART
SCALE
DRAWN by
REVISION
Finished surfaces must be parallel with each other within .0001. Surface of bore must be square with these surfaces within .0001 total indicator reading.
Surface of bore must be round and free from high spots within .0001 total indicator reading.
2.2188
2.2187
.8128
.8126
.438
.436
FINISH OF BORE 40-60 MICRO-INCHES
OPERATION: Finish Bore
MATERIAL: S.A.E. 1112 Annealed
R.P.M.: 2000 S.F.M.: 1200
MACHINE CYCLE: 43 seconds
TOOL LIFE: 75 pieces per grind.
MACHINE: Two spindle Excello
PREVIOUS PRACTICE: NONE, no other tool could do the job.

Tantung, the tough, shock resistant, non-ferrous cast alloy with the high red hardness is easily ground and performs at far greater feeds and speeds than high speed steels. Requiring no hardening and drawing operations. Tantung is ready for immediate application. Write today for additional information on Tantung and its wide range of economical applications as cutting tools, knife blades, saws, shell end mills, etc.

* Reg. U. S. Pat. Off.

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An affiliate of The Fansteel Metallurgical Corporation and The Vanadium Alloys Steel Company

TURN OUT HIGH QUALITY BIG CASTINGS FASTER, EASIER

...WITH WICKES NO. 4 DIE CASTING MACHINE

WICKES..manufacturers of heavy duty engine lathes and other specialized machinery for 97 years—now brings you the *fastest-producing, easiest-operating* die casting machine of its size. It's the new Wickes No. 4 Die Casting Machine for lead, tin, and zinc alloys. It's fast!—dies open and close at the rate of 750" per minute, with a momentary slowdown just before closing. Up to 600 shots per hour —up to 25 lbs. zinc each—are injected at pressures of 1,500 to 6,000 P.S.I. A lightning-fast accumulator injects the molten metal into the die cavity, eliminating auxiliary air compressors and nitrogen flasks. The Wickes No. 4 Die Casting Machine *reduces set-up time to a minimum,* because the distance between bolster plate and platen is easily adjusted from 9 to 23 inches with just one lever. Now dies can be installed in record time—*no time-wasting adjustment of tie bars.* Dual metal pots, alloy steel tie bars, shockless die clamping pressure applied through toggle mechanism.

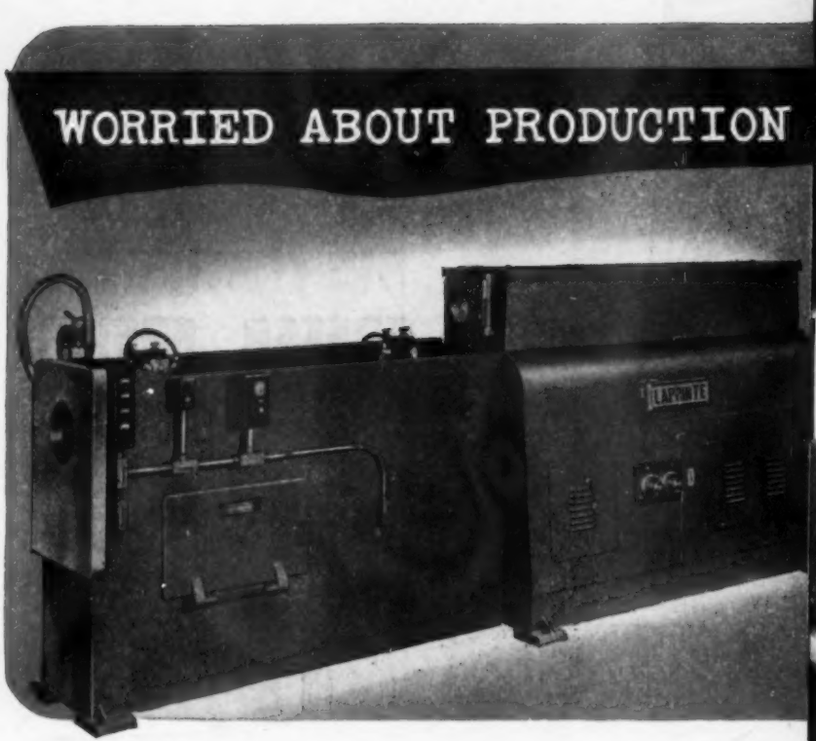
Our engineers will be glad to show you how the Wickes No. 4 Die Casting Machine will increase your profits by enabling you to produce a wide variety of high quality castings at high speed and lower cost in your plant. *Write today for complete particulars.*

WICKES BROTHERS

Established 1854

SAGINAW, MICHIGAN

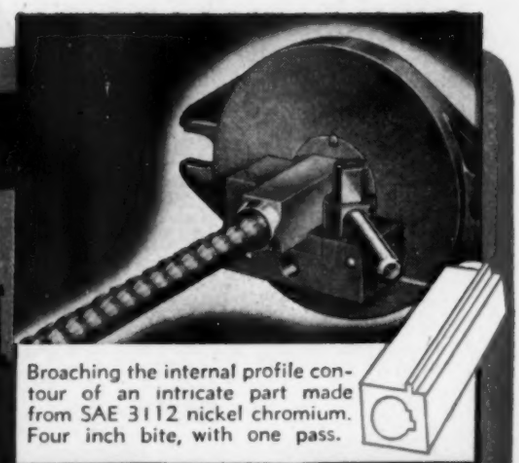
WORRIED ABOUT PRODUCTION



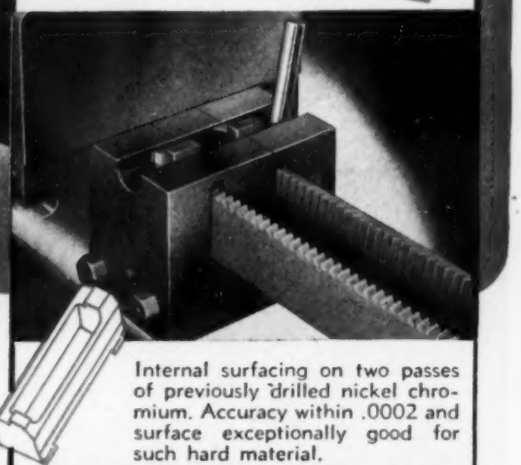
-and economy, too?

So was Mr. "X", a metal product manufacturer who was introduced to broaching during the war. His three Lapointe machines, which out-produced the rest of his machine line, couldn't be kept busy all the time.

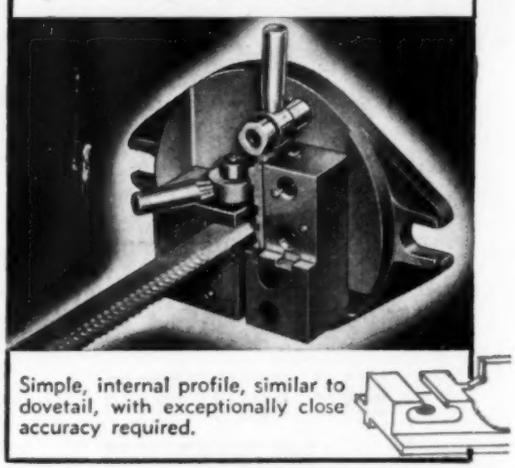
So Mr. "X" consulted the Lapointe Engineering Department and they in turn discovered three parts in his manufacturing process easily adapted to broaching. Three inexpensive fixtures and sets of tools were prepared for these three processes. It all added up to capitalizing on good machine investment, but Mr. "X" also got an added dividend. The cost of the three parts, including fixtures and tools, was 50% less than previous machining methods. Take a tip from Mr. "X"—investigate broaching today. Write for Booklet No. 23 or call Lapointe for aid in solving your specific problem—there is a broaching engineer located near you.



Broaching the internal profile contour of an intricate part made from SAE 3112 nickel chromium. Four inch bite, with one pass.



Internal surfacing on two passes of previously drilled nickel chromium. Accuracy within .0002 and surface exceptionally good for such hard material.



Simple, internal profile, similar to dovetail, with exceptionally close accuracy required.

The three above are all made on the same machine with interchangeable fixtures and broaches, assuring complete return on a machine investment, greater accuracy, and cheaper per part costs.

HUDSON LAPOINTE MASS.

THE Lapointe MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.

Branch Factory • Edgware • Middlesex • England

See the Lapointe exhibit at the Machine Tool Show, Section 642, at The Dodge Chicago Plant, September 17th through 26th.

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES

O.K. of a Great Critic...

A WHOLE PLANTFUL OF THEM WHO BUILD MOTORS TO SATISFY EXACTING BUYERS!

● Other plants may turn out *more* motors than the Star Plant. But you'll find no *better* motors . . . for when you see the Star Trademark you see the "O.K." on the efforts of hundreds of meticulous craftsmen working to critical standards.

Among them are the men who own the company. For Star's principals are born motor men, and the place to find them is out in the plant or around a drawing board, helping to make Star Motors as good as they can be.

Everybody at Star is exacting about quality . . . in design, materials, workmanship. There's a craftsman's spirit everywhere that words can't cover. But motor buyers who visit us always comment on it. And exacting motor users recognize that Star does things a bit better. That's why they specify Star where a motor must be better than "good enough".

WRITE FOR 8-PAGE DIGEST. It outlines Star Motors (½ to 200 HP) and Generators (to 150 KW) . . . names hard-to-satisfy buyers who are long-time customers . . . tells how Star becomes the "Motor Department" for customers. Star Electric Motor Co., 200 Bloomfield Ave., Bloomfield, New Jersey.

STAR MOTORS

POWER PACKAGED AS YOU NEED IT

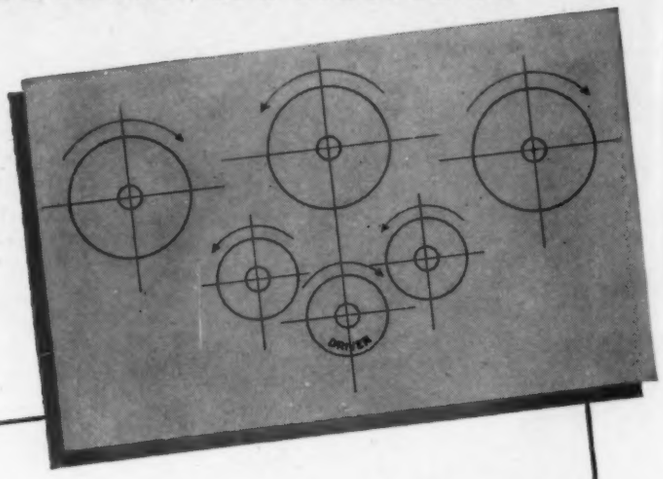
The Problem:

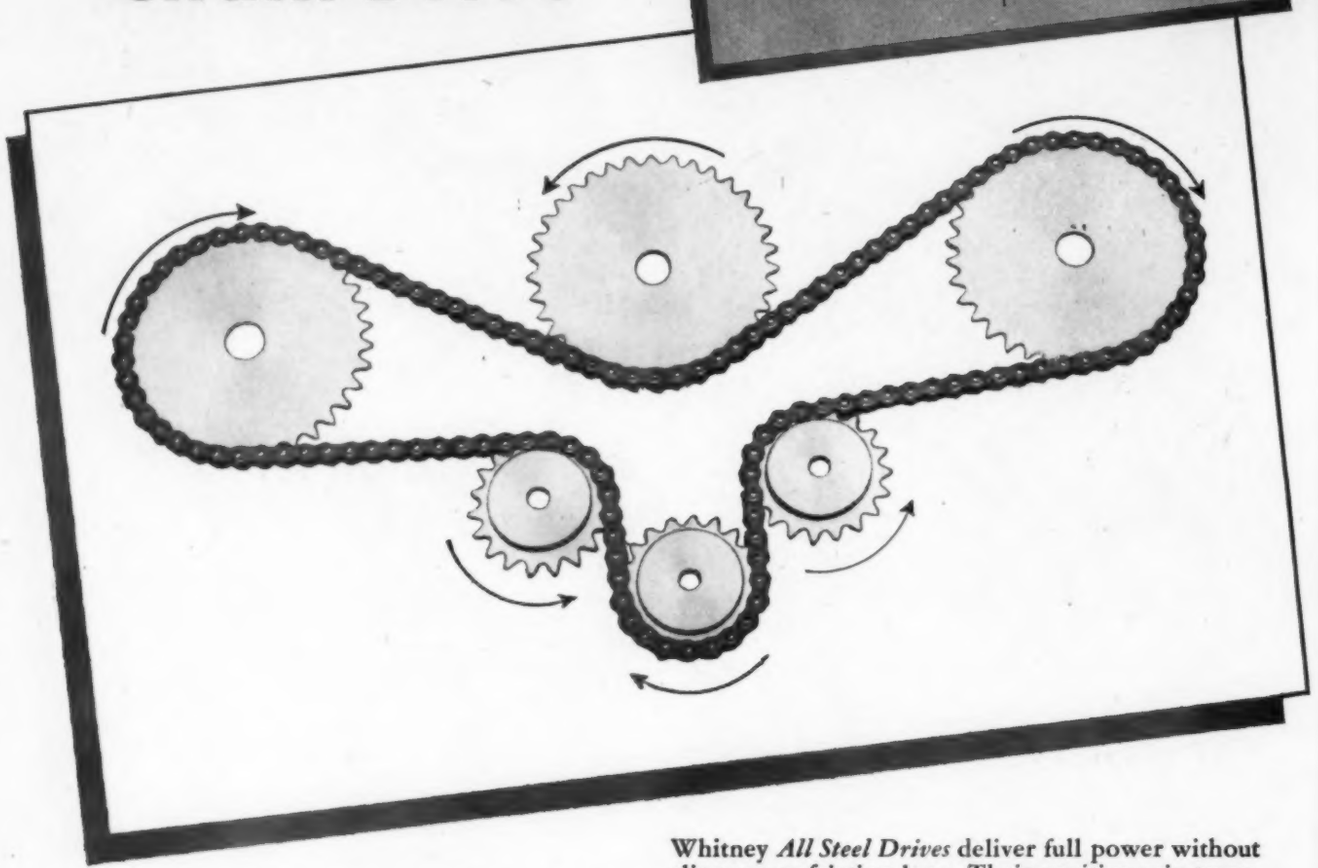
Drive five shafts: 2 clockwise, 3 counter-clockwise.

The Solution:

WHITNEY

Chain Drive





A power drive design problem called for driving five shafts by the driver . . . power transmission had to be *positive* with no time lag. Gears were out of the question as close center distances and other complications would create excessive costs. Whitney Chain and Cut Tooth Sprockets provided the solution.

No matter what your power drive problems, Whitney Chain and Cut Tooth Sprockets will meet your requirements. Their versatility and flexibility make them *first choice* for all types of equipment.

Whitney *All Steel Drives* deliver full power without slippage or friction loss. Their positive grip transmits constant uniform power from driver to driven mechanisms. They are easy to install . . . do not require frequent adjustment to maintain tension. Because Whitney Chain Drives operate slack on short or long centers, they do not impose unnecessary tension loads on shafts or bearings. Their rugged construction gives maximum service with minimum maintenance.

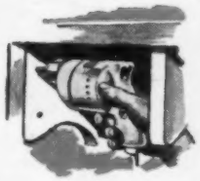
Investigate Whitney Chain Drives and cut tooth sprockets for your designs. Our engineers will help you with your problems. Write:

The Whitney Chain & Manufacturing Company, Hartford 2, Connecticut

Here's Why This "Handful of Power" is the Most Widely Used Electric Drill!

Easy to Use: The "HOLGUN"* is an easy drill to handle because it weighs only three pounds and is compact and perfectly balanced. Its smooth housings with the famous "Pistol Grip and Trigger Switch" fit naturally into any hand—right or left.

*Trade Mark Reg. U. S. Pat. Off.



Drills in Close Quarters: The Black & Decker 1/4" Electric HOLGUN is an ideal tool for drilling in hard-to-reach places because of its surprising compactness. Measures only 6 3/4" overall with short working clearance and spindle offset of only 3/4".

For Continuous Production Schedules: This drill has a B & D-built motor with abundant power for *continuous*, trouble-free drilling. Features like splined gear mounting and special ball spindle bearing keep it running under severe operating conditions.

The Right Power and Speed to Fit Your Jobs: The HOLGUN lets you pick the correct speeds for drilling in a wide variety of materials. Can be supplied with any of several spindle speeds from high torque at 500 r.p.m. to high speed at 5,000 r.p.m.

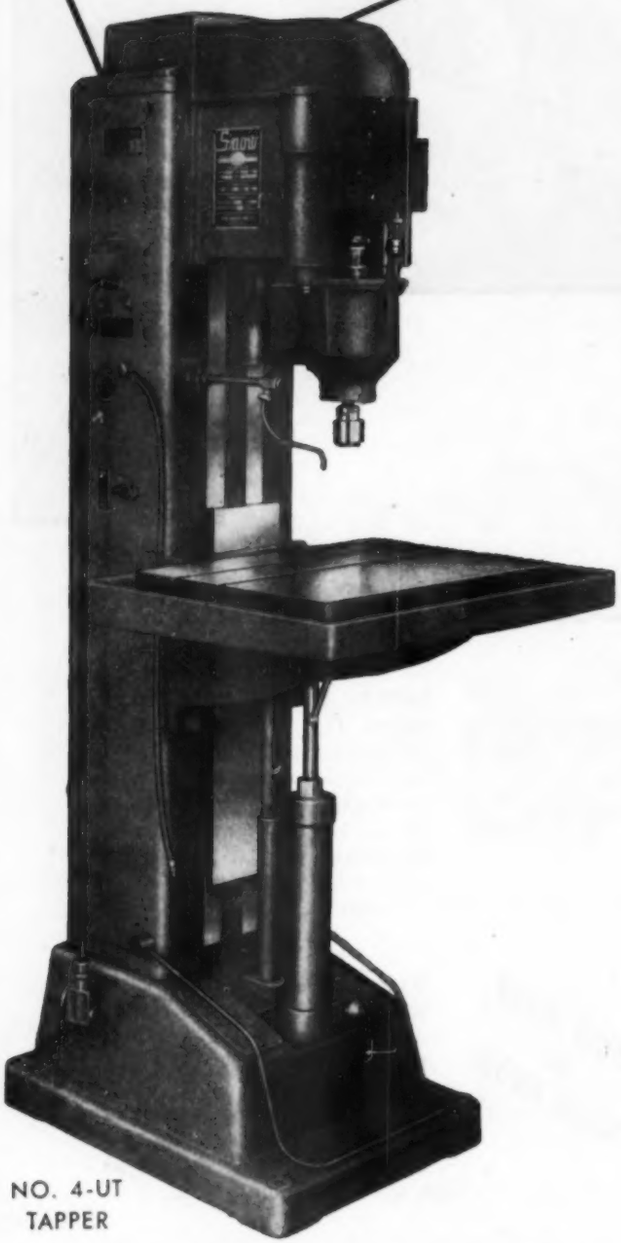
See Your Nearby Black & Decker Distributor for complete details on this most popular of Electric Drills. For full information on HOLGUNS and many other Black & Decker Portable Electric Tools, write for your free copy of our catalog to: The Black & Decker Mfg. Co., 616 Pennsylvania Ave., Towson 4, Md.

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS

COMPLETELY *Automatic* FIXTURES



NO. 4-UT TAPPER

NO. 557 MASTER DIAL FIXTURE

NO. 606 MASTER CLAMPING FIXTURE

NO. 612 MASTER VISE

for greater production for lower unit cost...

Get fast, positive, instantaneous feed—get maximum production at low cost, by using a standard Snow *automatic* holding fixture—essential complement to all three Snow Air Machine Tools.

Snow Tapping, Drilling and Threading machines are air-operated, electrically controlled—allow free interchange of any type of holding fixture. Split-second synchronization of a Snow fixture with a Snow machine is the perfect answer to all your tapping, drilling and threading problems.

Send prints or sample parts for production estimates and for quotations. Or write for catalog.

• AIR MACHINE TOOL

Snow

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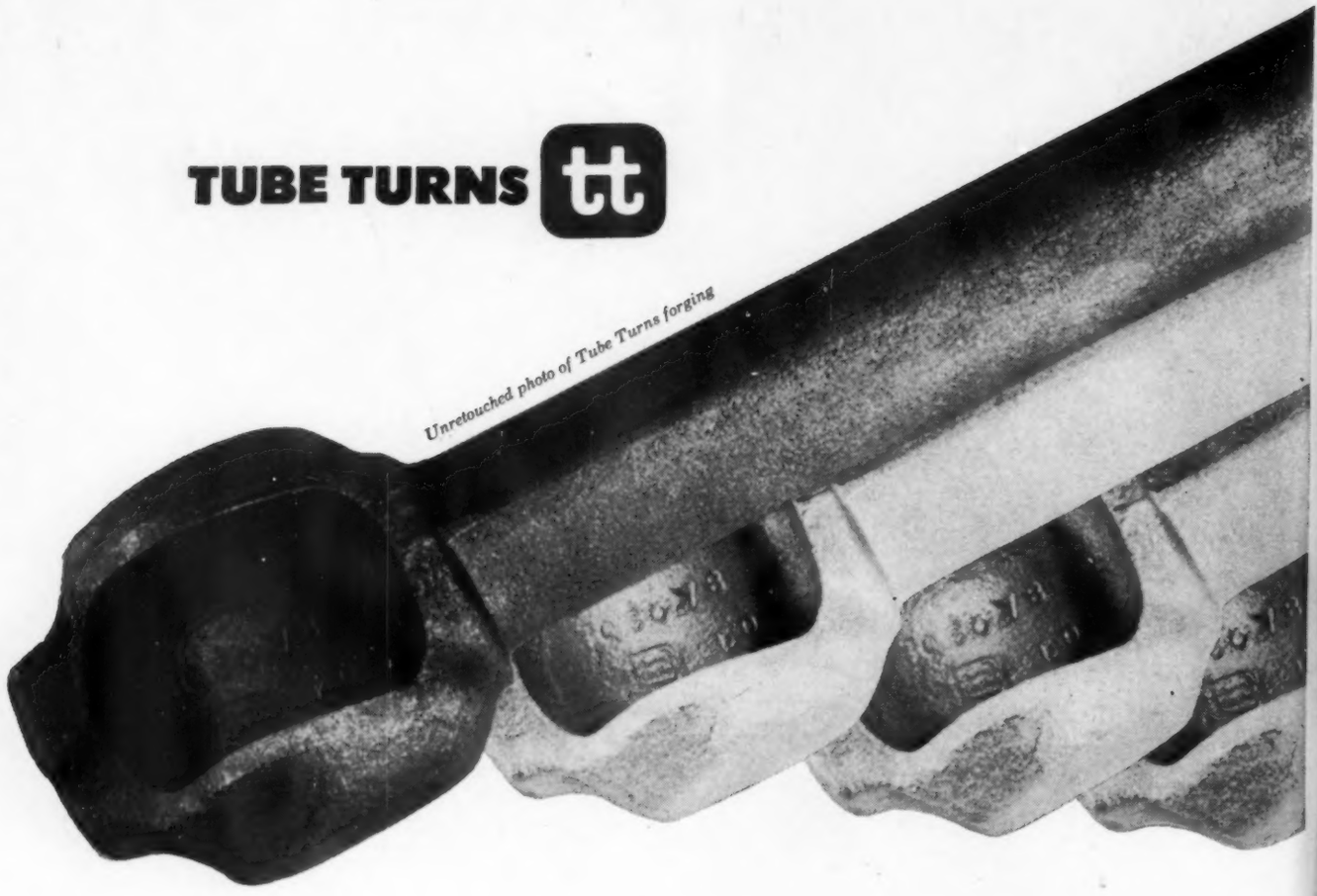
Since 1901 SHELTON, CONN.

TUBE TURNS tt



Unretouched photo of Tube Turns forging

Forgings for Industry

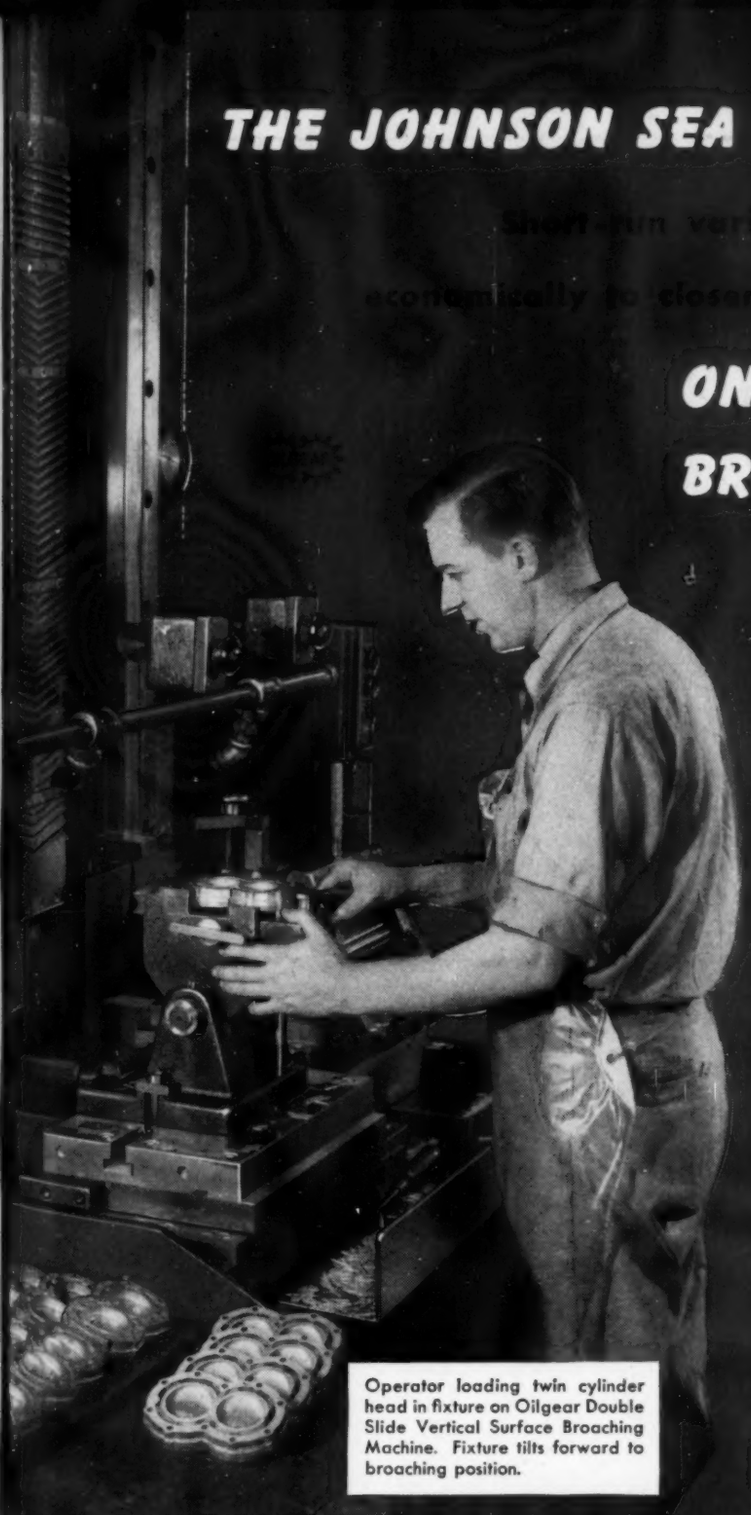
produced in quantity, economically and accurately within specified tolerances, on modern upsetters and high-speed mechanical presses, with precision dies designed by men who know metal.

TUBE TURNS, INC., LOUISVILLE 1, KENTUCKY

District offices at New York, Washington, D. C., Philadelphia, Pittsburgh, Detroit, Chicago, Houston, San Francisco, Los Angeles

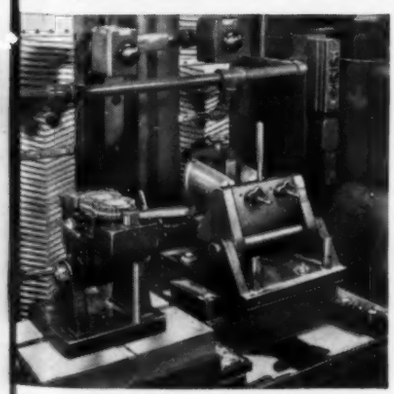
THE JOHNSON SEA HORSE SHOWS HOW

ON OILGEAR SURFACE BROACHING MACHINES



Operator loading twin cylinder head in fixture on Oilgear Double Slide Vertical Surface Broaching Machine. Fixture tilts forward to broaching position.

Oilgear Fluid Power



Twin cylinder head loaded on left hand fixture while two other parts in right hand fixture are being broached.

Fixtures and parts for water pump housing and twin cylinder head. Parts are also in loaded position.

SEE THIS MACHINE IN ACTION AT THE MACHINE TOOL SHOW, SEPTEMBER 17-26

At the Machine Tool Show in the Dodge Chicago plant, September 17 to 26, an Oilgear Double Slide Vertical Surface Broaching Machine will be shown in actual operation on parts described above. Be sure to see this versatile machine in operation.

1947

...BUT EMPLOYERS MUTUALS PHYSIOTHERAPY SAVED IT FOR THIS CARPENTER

A plunge into hot, searing tar when he fell from a scaffold left this carpenter's arm 40% disabled—with little possibility of improvement.

But after five months of treatment by Employers Mutuals physiotherapy department the disability was reduced to 5% and the man was able to go back to work at his trade.

* * *

It is this human, mutually helpful attitude of Employers Mutuals which make them such unusual, such fine insurance companies with which to carry your casualty and fire insurance.

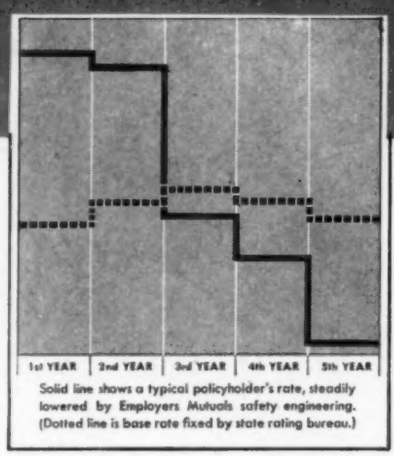
For Employers Mutuals are more than insurance selling organizations. They are service organizations skilled in accident prevention, industrial health programs, equitable claim adjustments, and other services which reduce your insurance costs.

* * *

Whether you own a car or home, employ people, or are liable for injuries sustained by a guest in your home or customers in your place of business, you need protection.

For a simple explanation of the insurance that will protect you, get in touch with the Employers Mutuals man.

He will give you full information on Public Liability . . . Automobile . . . Plate Glass . . . Burglary . . . Workmen's Compensation . . . Fidelity Bonds . . . Group Disability (Health, Accident, Hospitalization and Surgical Benefits) . . . and other casualty insurance . . . Fire . . . Tornado . . . Extended Coverage . . . Inland Marine . . . and allied lines of insurance. All policies are nonassessable.



Solid line shows a typical policyholder's rate, steadily lowered by Employers Mutuals safety engineering. (Dotted line is base rate fixed by state rating bureau.)

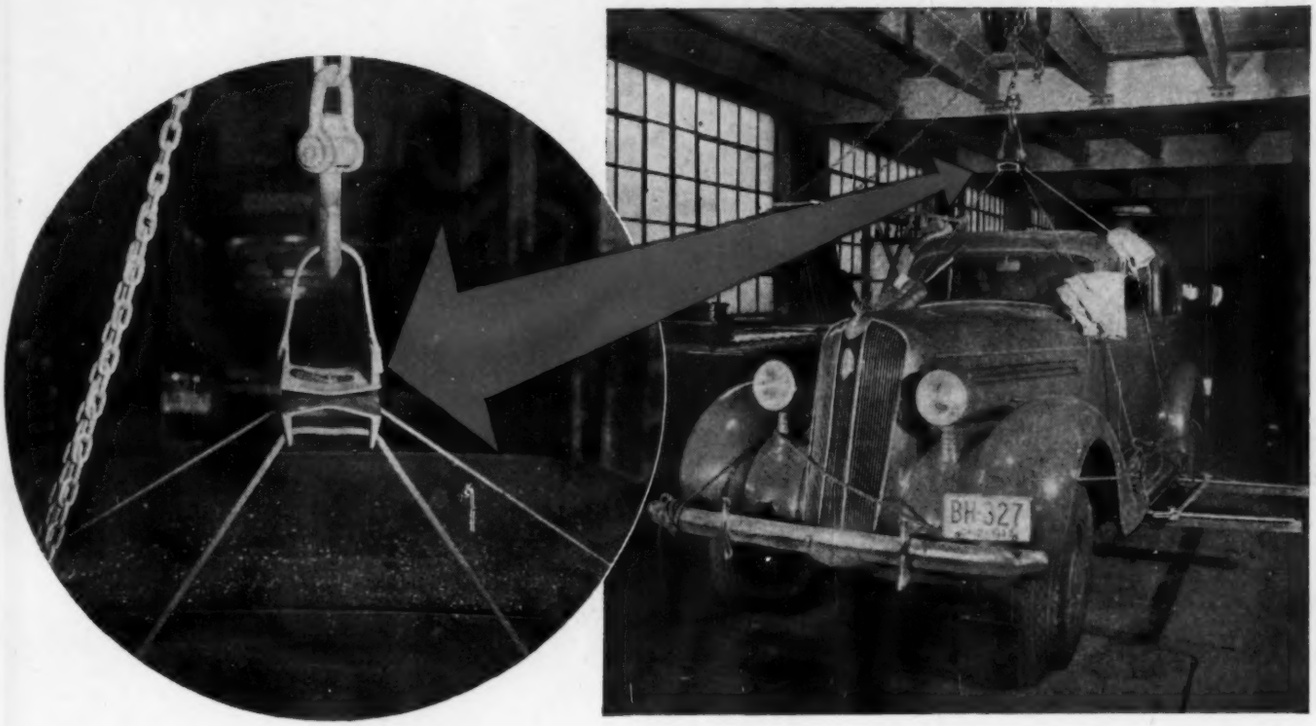
Write on your business letterhead for this fine new *Dictionary of Insurance Terms.* It will help you to understand insurance. **Address: Employers Mutuals of Wausau, Wausau, Wisconsin.**

EMPLOYERS MUTUALS OF WAUSAU . . . make insurance understandable

EMPLOYERS MUTUALS OF WAUSAU

EMPLOYERS MUTUAL LIABILITY INSURANCE COMPANY OF WISCONSIN
EMPLOYERS MUTUAL FIRE INSURANCE COMPANY
HOME OFFICE: WAUSAU, WISCONSIN
Offices in Principal Cities—Consult Your Telephone Directory

*Speed Nuts** are stronger than you might think



• Here's convincing proof of SPEED NUT holding power! A single fender type SPEED NUT weighing less than half-an-ounce, and used with a 5/16—10 Acme bolt, held together the two brackets suspending this 3,325-pound car.

• These photos were taken ten years ago, during the test that proved to automotive engineers that SPEED NUTS had what it takes for automotive assembly. Since that time, hundreds of millions of SPEED NUT brand fasteners have been used by car and truck manufacturers to speed up production and drastically reduce assembly costs.

• Other industries, too, are enthusiastic about the SPEED NUT System of Assembly. Hadn't you better check these streamlined fasteners now, to improve the assembly of your product? A letter will bring full details.

TINNERMAN PRODUCTS, INC., 2113 Fulton Road, Cleveland 13, Ohio

In Canada: Wallace Barnes Co., Ltd., Hamilton, Ontario
In England: Simmonds Aerocessories, Ltd., London

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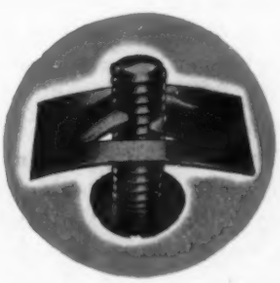
In Australia: Aerocessories, Pty. Ltd., Melbourne

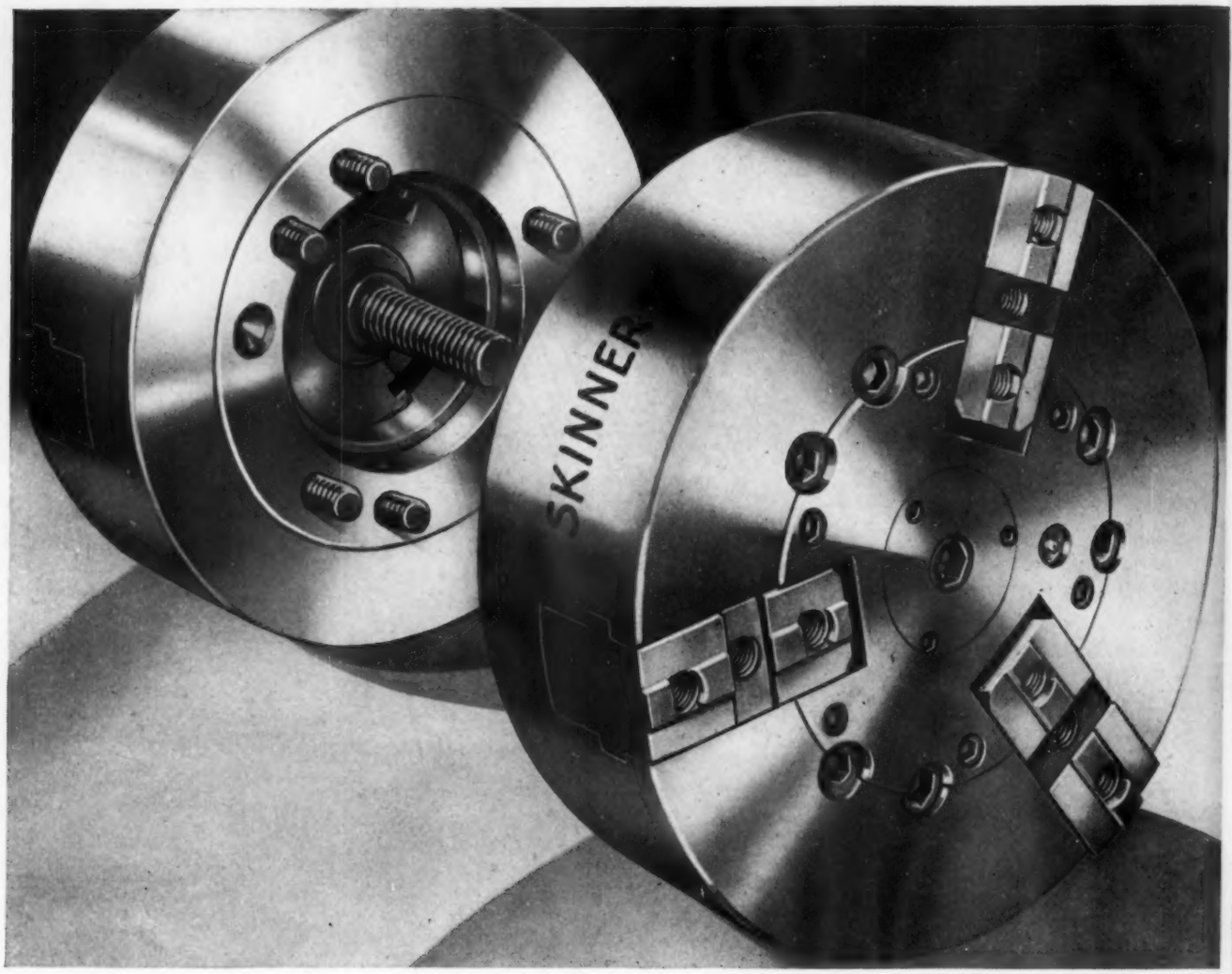
Speed MORE THAN 4000



*Nuts** PATENTED SHAPES AND SIZES

Trade Mark Reg. U. S. Pat. Off.

FASTEST THING IN FASTENINGS



FRONT & REAR VIEW SERIES 1300

Blue Chip Investment . . .

With a Skinner Power Chuck, work can be chucked so fast and so easily that production increases while operator fatigue is reduced. And because they are functionally designed and accurately constructed, production is more precise as well. Skinner Power Chucks are "Blue Chip" investments — bound to return good dividends for years and years.

These modern labor-saving devices have only four moving parts — a wedge and three jaws. This simplicity of construction results in several outstanding features. Initial accuracy of a high degree is more easily achieved and, with so few moving parts, it is maintained for a much longer time. A forged steel body of ample proportions to withstand strains far greater than will ever be met, yet machined so accurately as to be in perfect balance, permits the use of higher cutting speeds for the efficient use of carbide cutting tools.

In addition, a special wedge angle design gives greater gripping power and offers a wider margin of safety. *Once a Skinner Chuck grips the work it will not release, even if the air is completely cut off, until the operator is ready to remove the piece.* (See this remarkable demonstration at the Skinner Exhibit in Booth 638 at the Machine Tool Show!)

Power chucking with a Skinner Chuck is a time-saving method that offers "Blue Chip" attractions to any manufacturer who invests in machine tools today. Full details on this accurate, long-lived, cost-cutting equipment are contained in the Skinner Catalog No. 59. Write for it today.

The Skinner Chuck Co.

343 CHURCH STREET, NEW BRITAIN, CONN.

Skinner Chucks

SKINNER CHUCKS — THE CREST OF QUALITY

HAND & POWER OPERATED MACHINE CHUCKS – AIR CHUCK EQUIPMENT – FACE PLATE JAWS – MACHINE VISES

PRECISION-MADE

for precision performance

Reflecting the vast experience of the world's foremost file manufacturer, Nicholson Rotary Files and Burs, made of high speed steel, are offered with the assurance that they are:

Correct in shape.
Accurately cut or ground.
True-centered.
Expertly hardened.

Now available are types, shapes, sizes and cuts for every purpose:

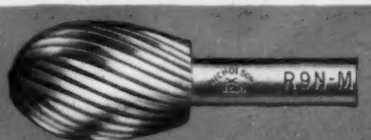
HAND CUT ROTARY FILES *for use principally on the ferrous metals and other hard materials.*

HIGH SPEED GROUND BURS *for use principally on the non-ferrous metals and other soft materials.*
(¼" and ⅛" shanks in both Hand Cut and Ground types.)

CEMENTED CARBIDE BURS *for extra efficiency and extra-fast metal removal on the long production runs.* (*¼" shanks only.*)

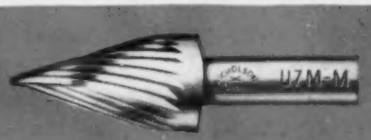
Typical shapes—nearly all in assorted head sizes—are shown below. Your industrial distributor can supply you.

NICHOLSON FILE COMPANY
57 Acorn Street Providence 1, R. I.
(In Canada, Port Hope, Ont.)

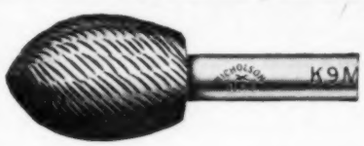


OVAL shape in HIGH SPEED GROUND BUR *(Illustrated)* and HAND CUT ROTARY FILE with ¼" and ⅛" shanks. CEMENTED CARBIDE BUR with ¼" shank.

BALL shape in HAND CUT ROTARY FILE *(Illustrated)* and HIGH SPEED GROUND BUR with ¼" and ⅛" shanks. CEMENTED CARBIDE BUR with ¼" shank.

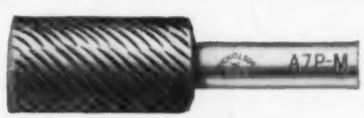


CONE shape in HIGH SPEED GROUND BUR *(Illustrated)* and HAND CUT ROTARY FILE with ¼" and ⅛" shanks. CEMENTED CARBIDE BUR with ¼" shank.

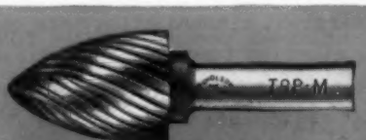


FLAME shape in HAND CUT ROTARY FILE *(Illustrated)* and HIGH SPEED GROUND BUR with ¼" and ⅛" shanks.

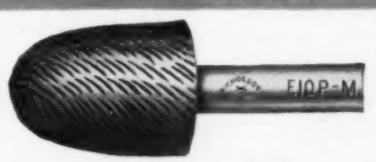
INVERTED CONE shape in HIGH SPEED GROUND BUR *(Illustrated)* and HAND CUT ROTARY FILE with ¼" shank.



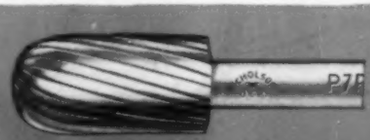
CYLINDRICAL FLAT END shape in HAND CUT ROTARY FILE *(Illustrated)* and HIGH SPEED GROUND BUR with ¼" and ⅛" shanks. CEMENTED CARBIDE BUR with ¼" shank.



TREE POINTED END shape in HIGH SPEED GROUND BUR *(Illustrated)* and HAND CUT ROTARY FILE with ¼" and ⅛" shanks. CEMENTED CARBIDE BUR with ¼" shank.



TREE RADIUS END shape in HAND CUT ROTARY FILE *(Illustrated)*, HIGH SPEED GROUND BUR and CEMENTED CARBIDE BUR with ¼" shank.



CYLINDRICAL RADIUS END shape in HIGH SPEED GROUND BUR *(Illustrated)* and HAND CUT ROTARY FILE with ¼" and ⅛" shanks. CEMENTED CARBIDE BUR with ¼" shank.

NICHOLSON ROTARY FILES

HAND CUT AND GROUND—FOR EVERY PURPOSE

NICHOLSON U.S.A.

STANDARD ENGINEERS NOTEBOOK

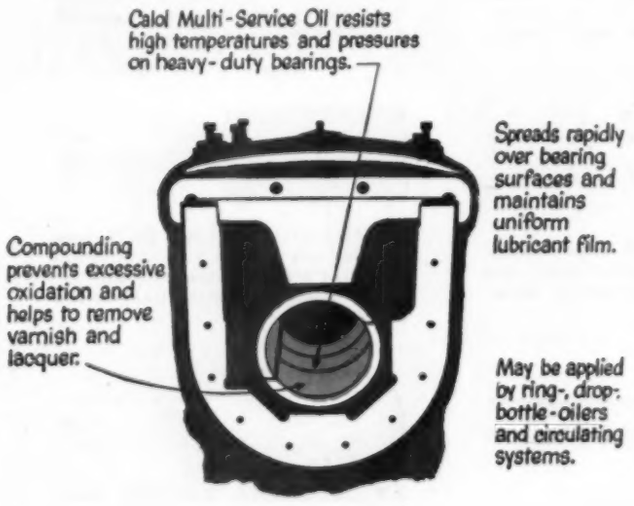
CALOL RPM

Multi-Service Oil efficient in tough service

Because it is made of high-quality stable oils and contains detergent and oxidation-resistant compounds, Calol Multi-Service Oil has decreased the amount of oil used in air compressors as much as 20% in some cases. It is also highly efficient in the lubrication of natural gas engines, industrial Diesel engines, vacuum and pressure pumps and enclosed reduction gears and their integral parts.

Calol Multi-Service Oil spreads rapidly on bearing surfaces, adheres tightly and withstands high temperatures and pressures. It comes in six viscosity grades: 45X, 50X, 55X (SAE 20), 65X (SAE 30), 75X (SAE 40) and 85X (SAE 50).

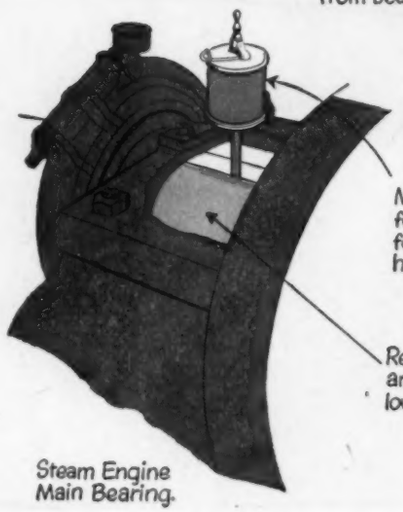
Where rapid separation from water is not required, Calol Multi-Service Oil may be applied satisfactorily by oil circulating systems. It is also applied by ring-, drop-, bottle-oilers and by hand oiling.


Calol Multi-Service Oil resists high temperatures and pressures on heavy-duty bearings.
Spreads rapidly over bearing surfaces and maintains uniform lubricant film.
Compounding prevents excessive oxidation and helps to remove varnish and lacquer.
May be applied by ring-, drop-, bottle-oilers and circulating systems.

Air Compressor Main Bearing.

This drawing prepared with cooperation of Chicago Pneumatic Tool Co.

Calol Red Engine Oil X is compounded to resist high pressure and displacement from bearing surfaces.


High affinity for metal cuts consumption and helps prevent rusting.
May be applied by drop-feed, ring, chain, wick-feed oilers or by hand oiling.
Reduces starting torque and friction in high-load, low-speed conditions.

Steam Engine Main Bearing.

New compounded Red Engine Oil cuts expense

To meet severe conditions encountered in the lubrication of external bearings of general industrial machinery, Calol Red Engine Oil X was recently developed and added to the Calol Red Engine Oil line. This new oil comes in three viscosity grades: 13X, 16X, and 26X.

Calol Red Engine Oil X is made from selected mineral oils to which are added special compounds. The high quality base oils and special additives give it outstanding ability to maintain a tough oil film on bearings in heavy-load high-temperature conditions. Compared to straight mineral oils, this cuts consumption, lowers starting torque and frictional resistance, gives more protection against rusting and promotes better circulation in ring-, and chain-oilers.

Calol Red Engine Oil X has a low pour test which allows easy application in a wide range of atmospheric temperatures.

Trademarks, "Calol," "RPM," Reg. U. S. Pat. Off.

For additional information and the name of your nearest Distributor, write Standard of California, 225 Bush Street, San Francisco 20, Calif.; The California Oil Company, 30 Rockefeller Plaza, New York 20, N. Y.; The California Company, 17th and Stout Streets, Denver 1, Colo.; Standard Oil Company of Texas, El Paso, Texas.

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The fatigue strength and conformability of Lead-Tin Bronze—

Now married for matchless performance

in N-B-M GRIDDED BEARINGS

By combining the best features of both Silver Babbitt and Lead-Tin Bronze in precision-spaced lands and grids, N-B-M centrifugally-cast Gridded Bearings provide every requirement for Diesel engine and similar high-speed, heavy-duty service.

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These bearings are now operating in Diesel engine connecting rod service under loads of over 3,500 p. s. i. projected area. Our exclusive new manufacturing process now makes them available at "mass-production" savings. May we send you complete engineering data?

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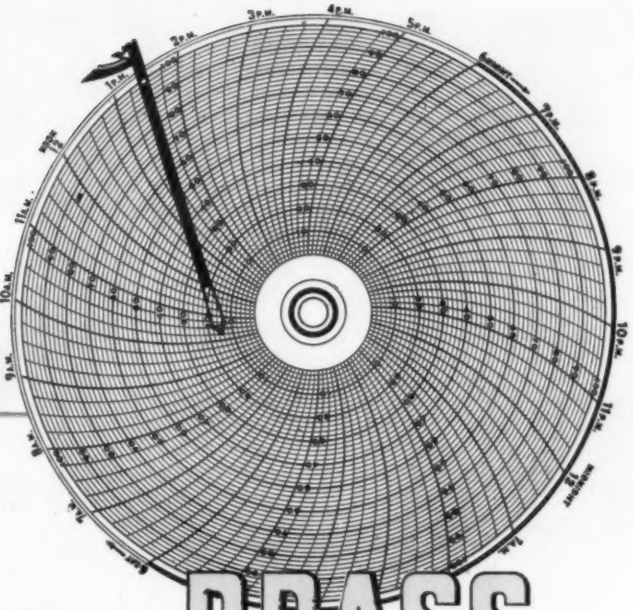

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Ever notice the preponderance of Brass and other Copper-Alloy parts in indicating, recording and control instruments? You know the reasons: These are durable, workable, wear-resistant metals. They possess a high degree of corrosion resistance... and the ability to ward off fatigue failure caused by vibration. That means long service life.

For the production of precision instrument parts, many manufacturers have found Brass to be the most dependable and economical metal to use... because *any* basic forming or machining operation that can be done on *any* metal can be done on Brass—usually faster, more accurately, and at less cost.

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General Offices: Waterbury 88, Connecticut

Subsidiary of Anaconda Copper Mining Company

In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

Anaconda Copper Alloys

AN EXAMPLE OF COPPER-ALLOY PARTS IN INSTRUMENTS IS ILLUSTRATED ON THE FOLLOWING PAGE ➡

(continued from preceding page)

COPPER ALLOY COMPONENTS
for dependable performance

This Combination Fan and Limit Control is a Twin Contact Control manufactured by the Perfex Corporation of Milwaukee, Wisconsin. It is used in forced warm-air heating systems to protect against overheating; to improve operating efficiency; and to permit fan operation only when warm air is available. The parts illustrated above in full scale are made of Anaconda Metals which contribute, at a moderate cost, long operating life and dependable performance.

The American Brass Company has had a great deal of experience in supplying Brass and other Copper Alloys in the form, temper and grain size most suitable and economical for the production of precision instrument parts. Our Technical Department will welcome the opportunity of working with you. 47117

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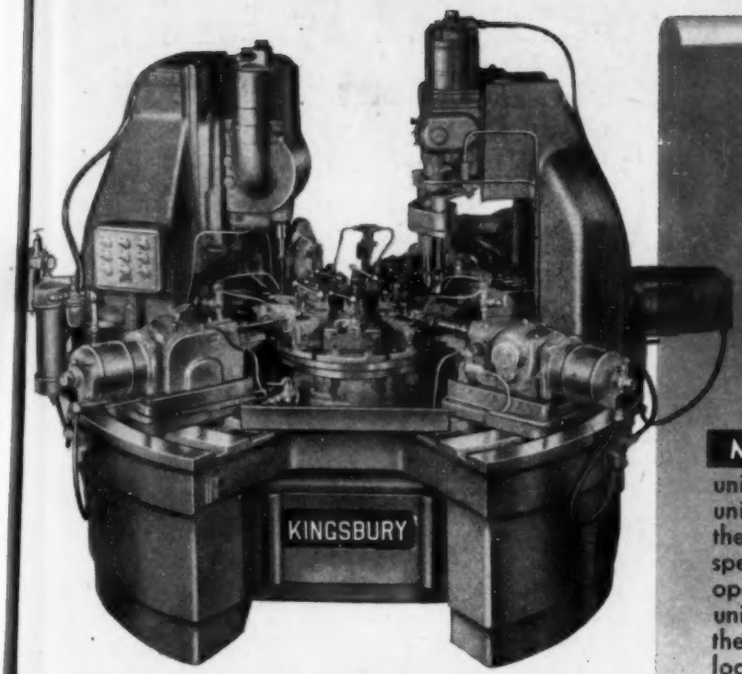
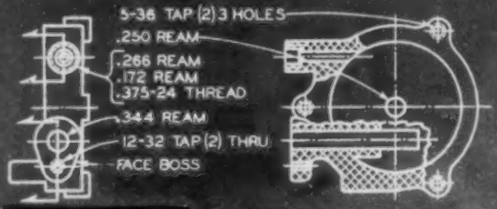
Anaconda Copper & Copper Alloys



If you have problems similar to these, send us a print showing operations and hourly output. We will quote on a completely tooled machine, ready for use. It will have standard units up to 5 hp each and will do accurate work for years at intensive production. Kingsbury Machine Tool Corp., Keene, N. H.

DIE CAST PISTON HOUSING

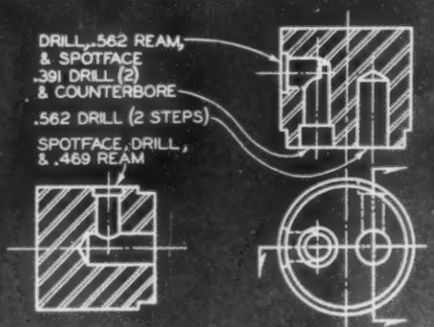


PROBLEM Ream, tap, face and thread 390 pieces per hour with one operator. The reamed holes must be located accurately and have a fine finish.

METHOD Six horizontal and two vertical units perform all of the operations shown. One unit has a three-spindle auxiliary head for tapping the three 5-36 holes, as they require the same speed and feed. Even though many of the other operations are parallel, there is an independent unit for each one. In that way each tool runs at the correct speed and feed for a fine finish and the location of each spindle is accurate to precise indicator readings. The guide bushings for the reamers are in plates that pilot onto the fixtures. Data: 20-in. index table, 7 stations. Base diameter: 80 in. Gross Production: 507 pieces per hour with one operator.

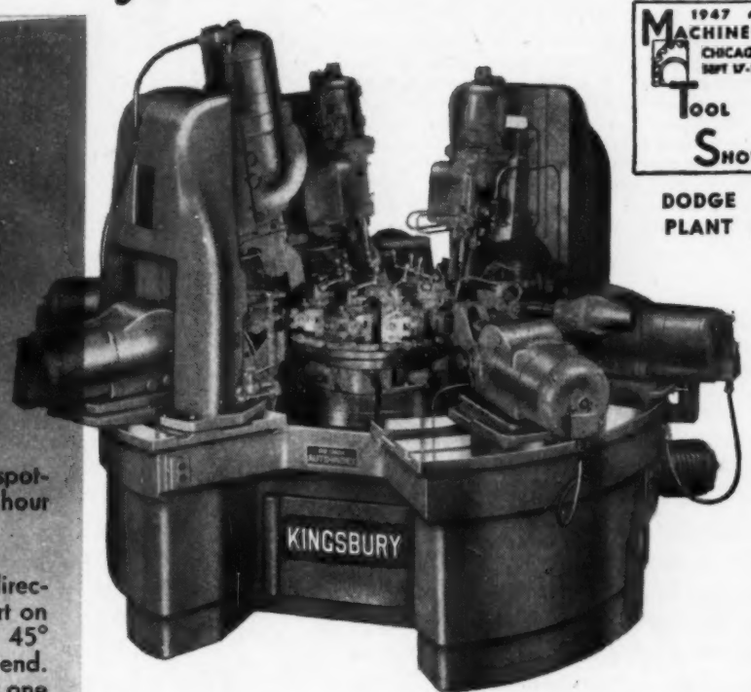
COMBINED OPERATIONS *for* HIGH PRODUCTION

STEEL REFRIGERATOR PART



PROBLEM Drill, counterbore, ream and spotface from three sides at a rate of 200 pieces per hour with one operator.

METHOD Operations are from three directions. One is on the end and two are 90° apart on the periphery. Five horizontal units, mounted 45° to the right off the radial center line, work on the end. Two units, mounted 45° to the left, operate on one peripheral hole. Three vertical units operate on the other hole on the periphery. Idle stations beside the operator give him enough room. Data: 20 in. index table, 9 stations. Base Diameter: 80 in. Gross Production: 255 pieces per hour with one operator.



1947 Machine Tool Show Chicago Sept 17-26

DODGE PLANT

74

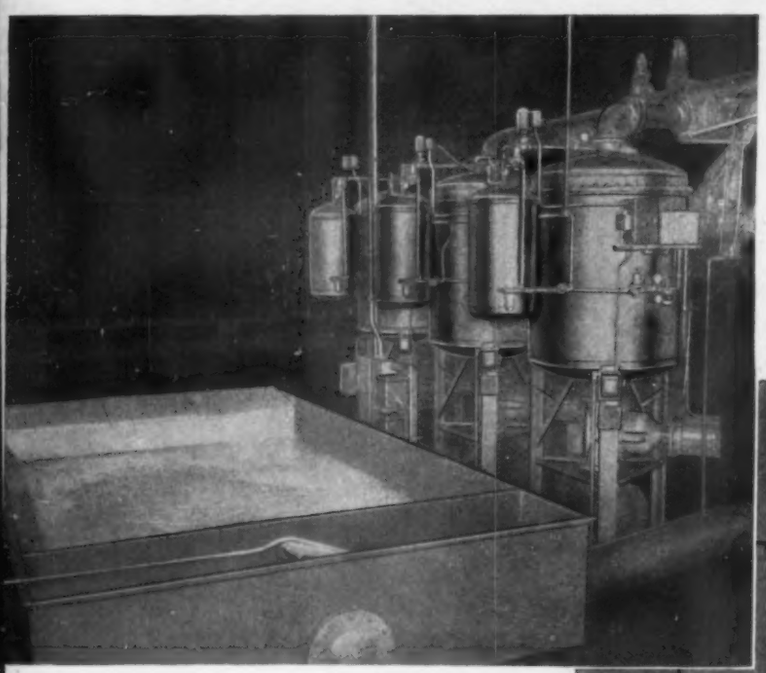
KINGSBURY

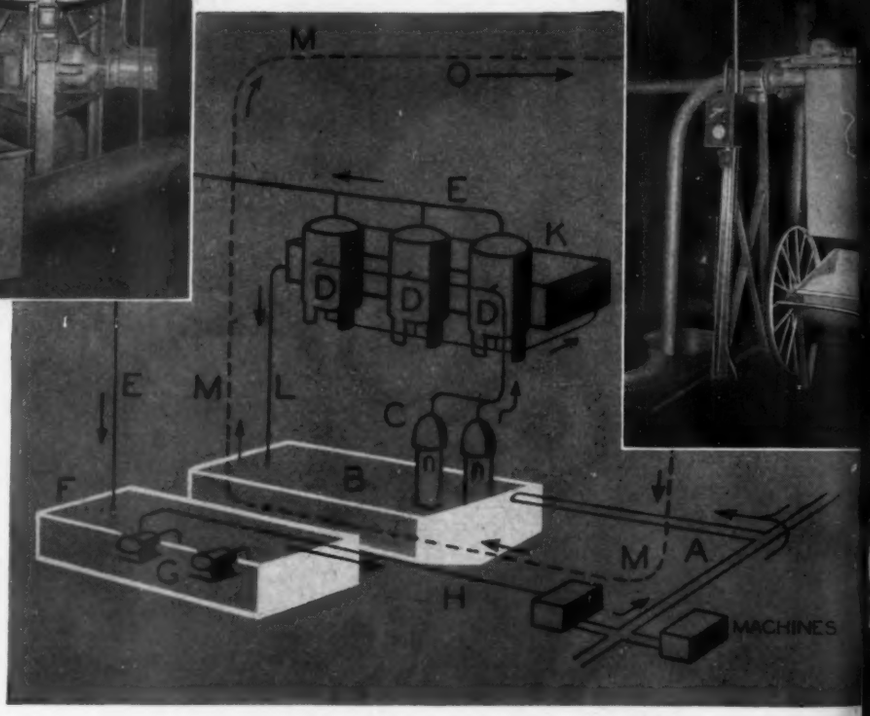
HONAN-CRANE CLARIFICATION of machine tool coolants used by Ford Moto Company in motor building at River Roug

Efficient Central System Is Part of Program to Employ Improved Methods and Processes Which Are Reflected in Better Working Conditions

SPECIFICALLY, HERE ARE THE ADVANTAGES:

- Improved Production
- Reduced Spoilage
- Improved Surface of Product
- Increased Tool & Wheel Life
- Reduced Coolant Cost by Extension of Coolant Life From One Day to Six Months—Or More
- Substantially Reduced Stream Pollution Caused By Dumping of Dirty Coolant
- Eliminated Down-Time Caused Plugged Lines
- Eliminated Use of Filter Bags
- Saved Man-Hours Required Changing Filter Bags
- Eliminated Need For Daily Su Cleaning





By continuous central system clarification, the Honan-Crane equipment supplies a constant flow of clean coolant at the rate of 2,500 gallons per minute for Cincinnati Centerless Grinders (No. 2's and No. 5's), Excello Pin-Boring machines and Baird Ring-Groovers employed in machining aluminum pistons. The Cincinnatis use wheels; the Excellos, tools and locators (operating to tolerances of .0001") and the Bairds, tools. All are supplied with the same coolant.

Please refer to diagram for oil circuit in the Ford system. Used coolant is removed from machines by gravity system through "U" shaped floor trenches **A** and dropped to dirty oil tank **B** below floor. Coolant is then removed from dirty oil tank by sump pumps **C** and passed through clarifiers **D** where all objectionable abrasives are removed. Coolant then passes through line **E** to clean oil reservoir **F** which is also below floor. Pumps **G** supply clean coolant to machines through lines **H**. Coolant and chips from automatic blow-down of clarifiers are discharged into blow-down tank **K**, from which coolant and suspended abrasives go through line **L** to dirty oil tank. Chips are continually removed from dirty oil tank **B** by endless plug-and-cable type conveyor **M** and deposited in chip-collector **O** which is easily unloaded (see photograph).

There is a coolant-clarification method—by Honan-Crane equipment—suitable to your operation—as a direct-connected, single machine installation; as a modified central system through use of portable transfer and sump cleaning equipment; or a continuous circuit central system similar to that described in the Ford plant.

May we send you more complete details on the Ford installation and case histories of other similar systems—and complete information on Honan-Crane Clarification equipment? Please fill out and mail the coupon.

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205 WABASH AVENUE
LEBANON, INDIANA

☐ Please Send Me Full Information On Cutting Tool Coolant Clarification and Details on Honan-Crane Clarification Equipment.

☐ Please Have A Sales-Engineer Call.

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FOR OXYGEN ACETYLENE AIR, GASOLINE OIL, GREASE STEAM

The adaptability of Hansen Couplings to so many different uses is the best possible evidence of their correct design. Our representatives will be glad to discuss with your engineers the possibilities and advantages of Hansen Couplings.

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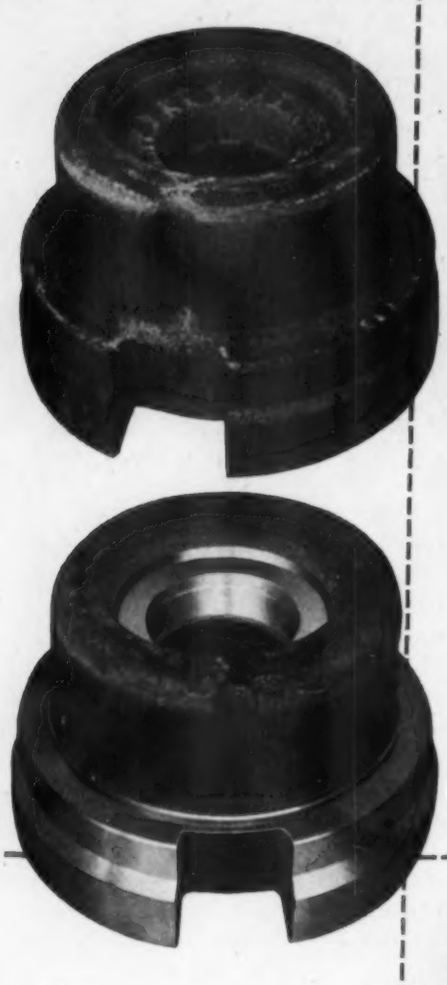
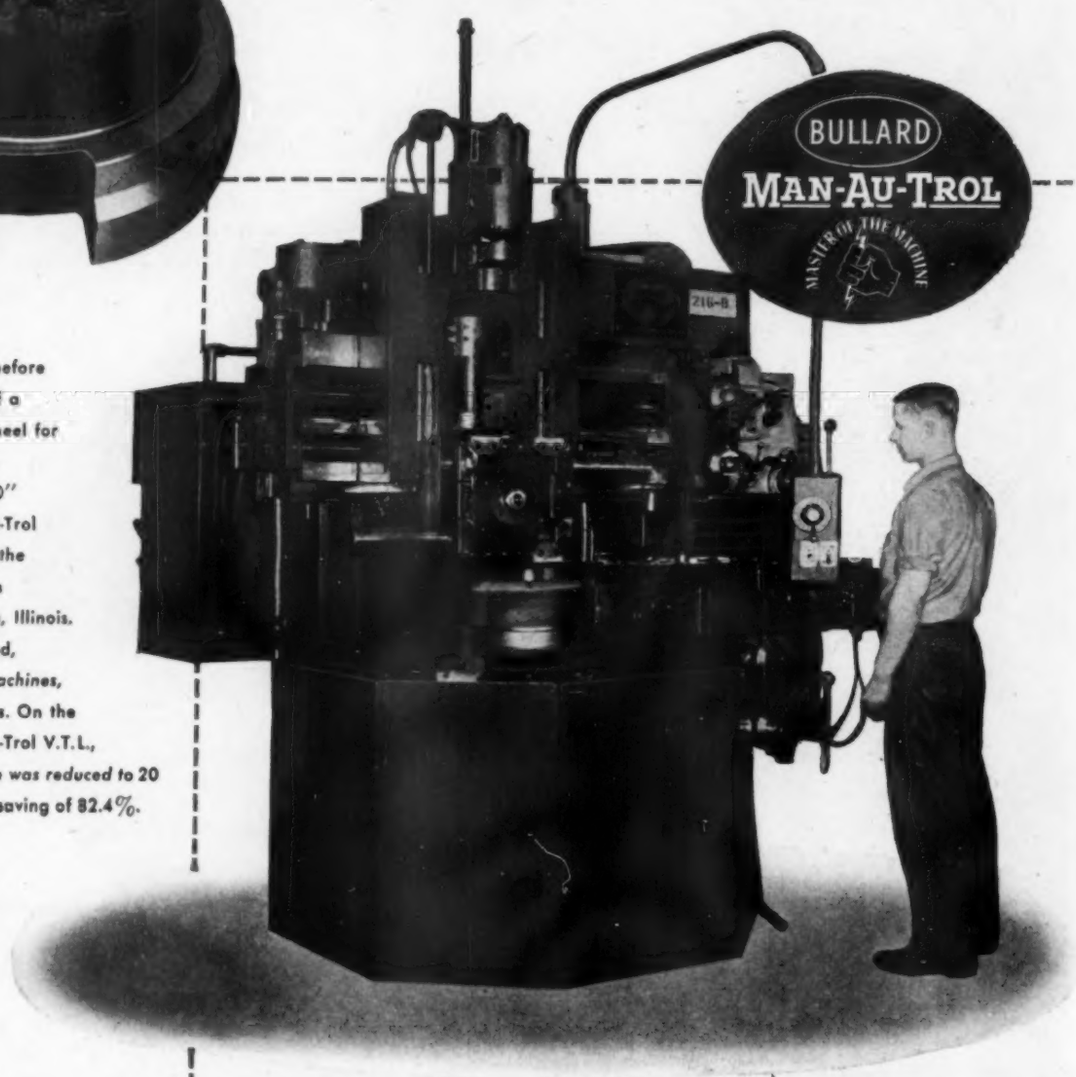
Cast Iron Drive Wheels Machined 5 Times Faster on a BULLARD Man-Au-Trol V.T.L.



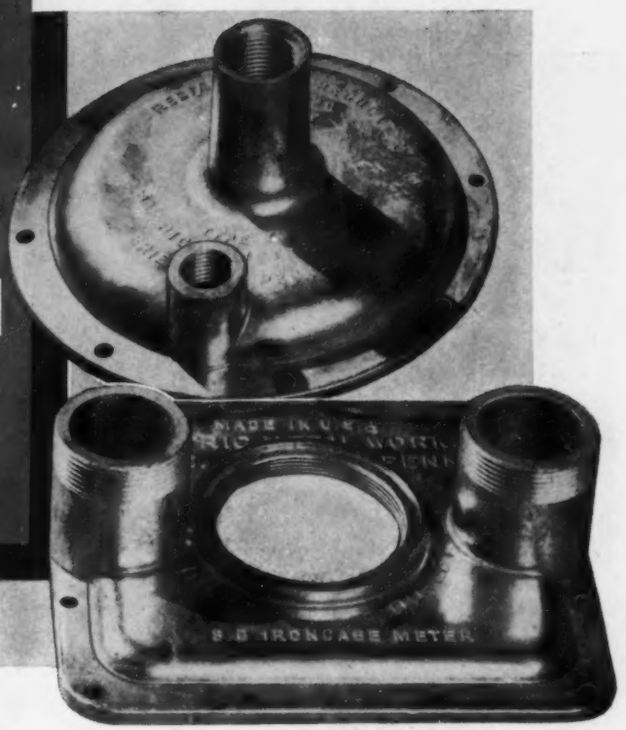
No other machine offers such a cost-lowering combination of productivity, versatility and accuracy as a *BULLARD* Man-Au-Trol Vertical Turret Lathe. Bulletin MAV-G-1 tells you why. Write for your copy today. THE BULLARD COMPANY, Bridgeport 2, Connecticut.



Here are shown before and after shots of a cast iron drive wheel for a Motor Grader, machined on a 30" *BULLARD* Man-Au-Trol Vertical Turret Lathe by Austin-Western Company, Aurora, Illinois. The former method, employing *two machines*, took 1 9/10 hours. On the *BULLARD* Man-Au-Trol V.T.L., *actual cutting time was reduced to 20 minutes*... a time saving of 82.4%.

BULLARD CREATES ***NEW METHODS*** TO MAKE MACHINES DO MORE

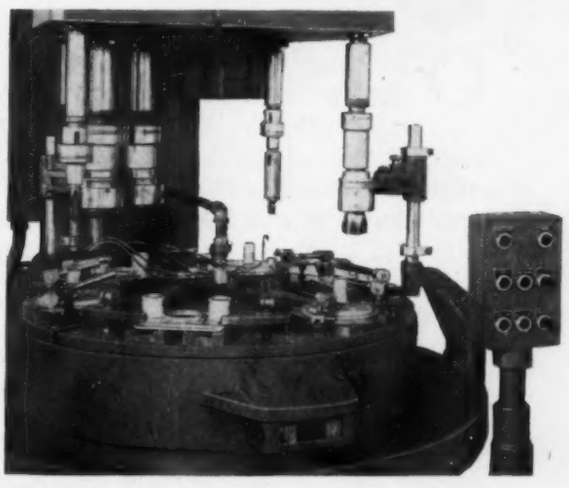
1 MACHINE for
2 DIFFERENT PARTS with
3 DIFFERENT OPERATIONS and
4 DIFFERENT SIZES

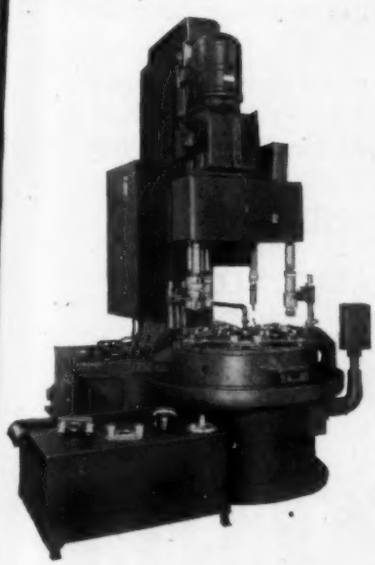


▲ Two Different Meter Parts, requiring Threaded and Tapped Diameters of Separate Lengths and Size, Machined Simultaneously on BARNESDRILL No. 5 Vertical Hydraulic Unit-Type Machine.

5 Separate Thread Diameters Finish-Machined in One Operation on BARNESDRILL Vertical Hydraulic Unit-Type Machine

The problem of multiple handling and machining these meter parts was reduced to one automatic operation on a BARNESDRILL Hydraulic Unit-Type Machine. Five different diameters are threaded and tapped simultaneously in a fully automatic machine cycle requiring only 40 seconds for completion. Operator simply loads and unloads pieces at the end of each cycle. As a result cost per piece is greatle reduced, operator efficiency increased, and a total production of 150 pieces per hour (75 of each) is obtained.





BARNESDRILL Hydraulic Production Units are adaptable to a large number of drilling, reaming, tapping, threading, facing, counterboring and milling operations with similar efficiency and savings. Consult your BARNESDRILL Representative for details on application to your machining problems.

SEND for copies of new bulletins describing Hydraulic Units and Special Tooling and Fixtures. Ask for Bulletins B-1504 and B-34.

SEE THESE MACHINES IN OPERATION AT OUR BOOTH NO. 42, NATIONAL MACHINE TOOL SHOW, CHICAGO, SEPTEMBER 17-26

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- SLUSHING OIL
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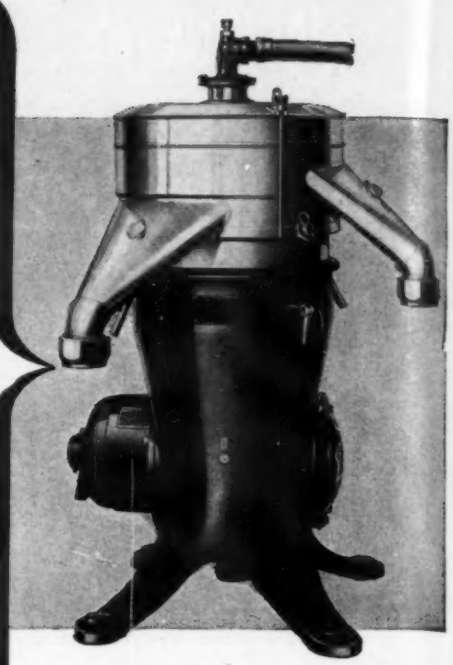

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OILS that are only "halfway clean" aren't clean enough for many factory applications. Water renders slushing compounds and hydraulic oils actually harmful. Dirt and metallic particles spoil cutting oils and grinding coolant.

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De Laval systems can be applied profitably to the needs of almost every shop, large or small. Portable "Uni-Matic" Oil Purifiers can be used for many different applications in one shop. Or, where operations are extensive enough to warrant it, a specially designed De Laval system can be permanently installed.

Discuss your oil purifying problems with our engineers. They'll show you just how—and how much—clean oil can pay off in your plant.

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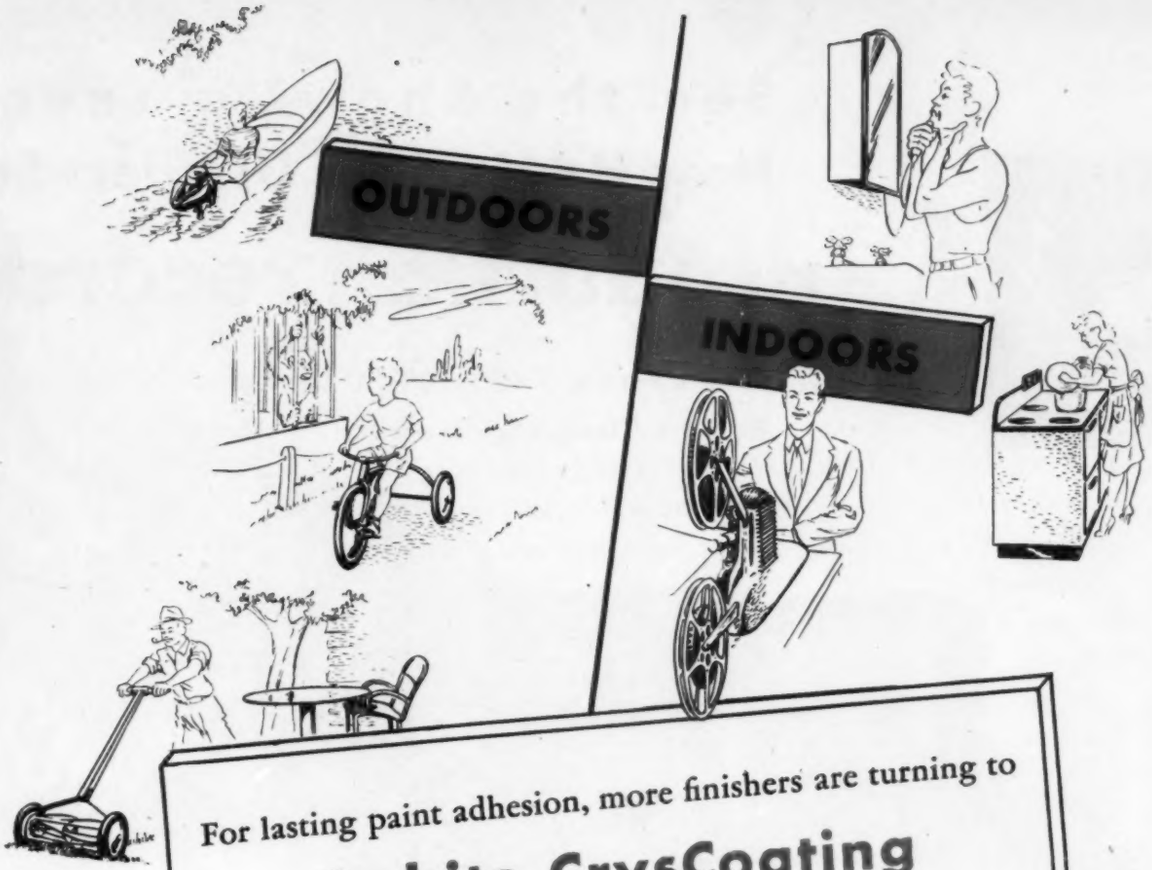

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Iron Sole Plates

Automotive Valves

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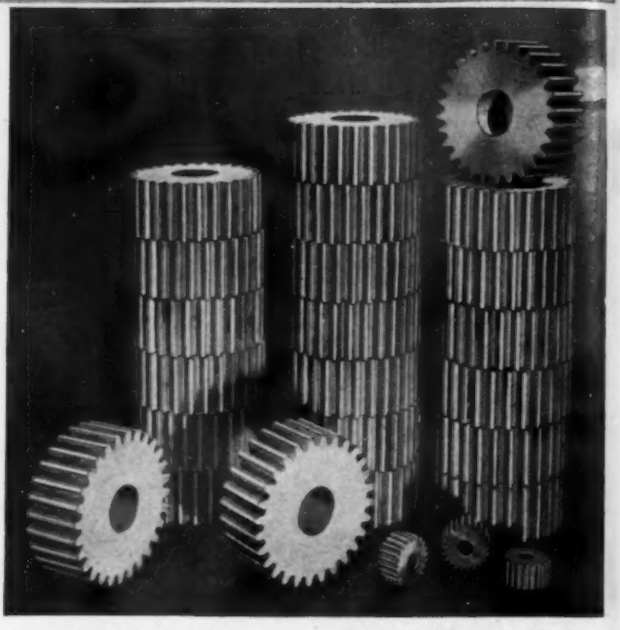
BAKELITE *Silent Pinions*



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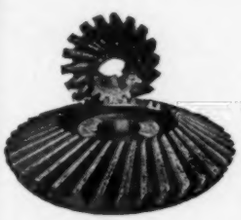

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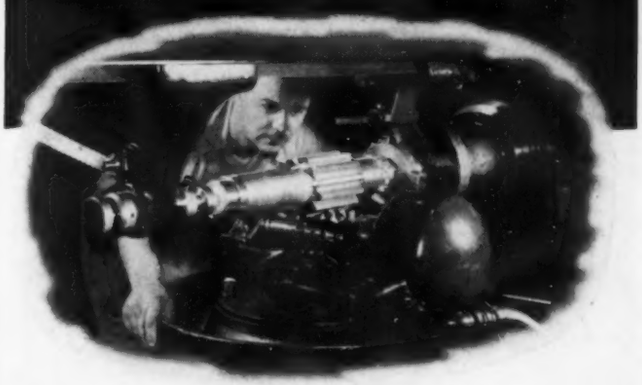

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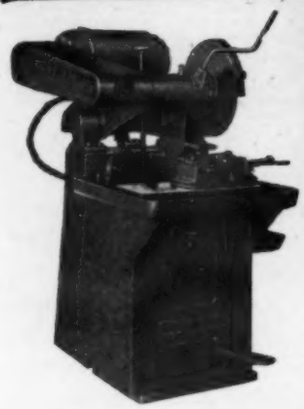

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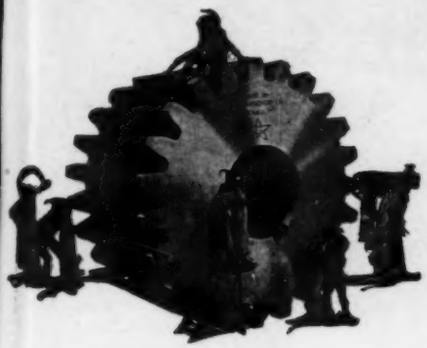

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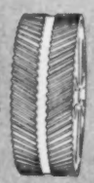

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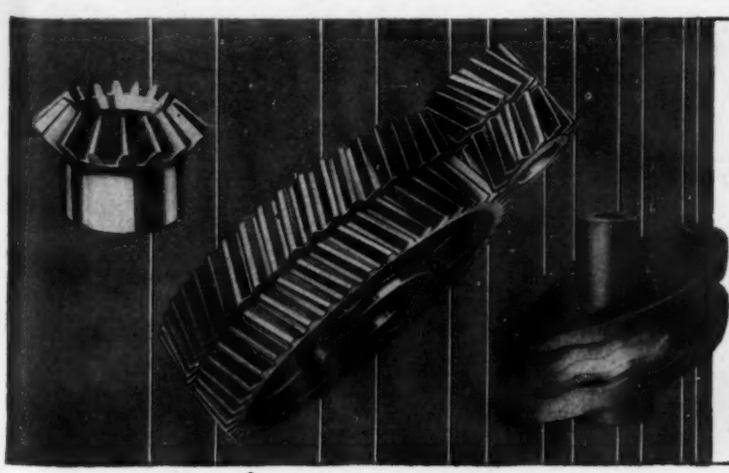

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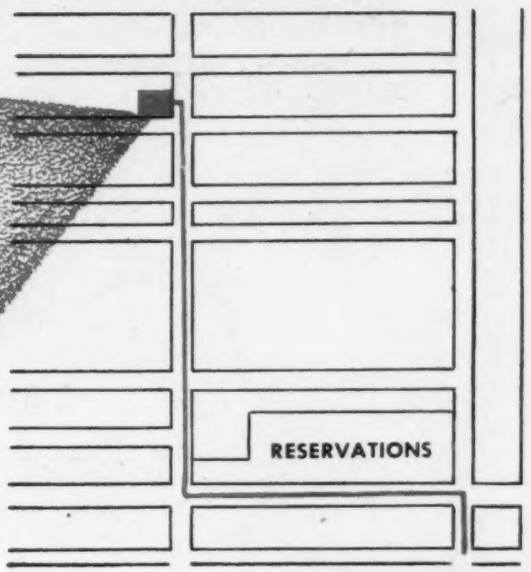

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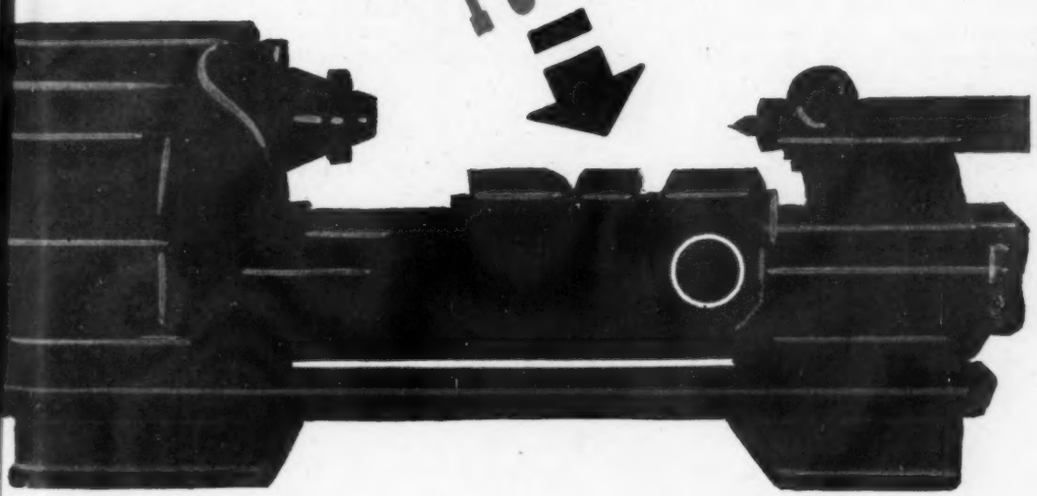

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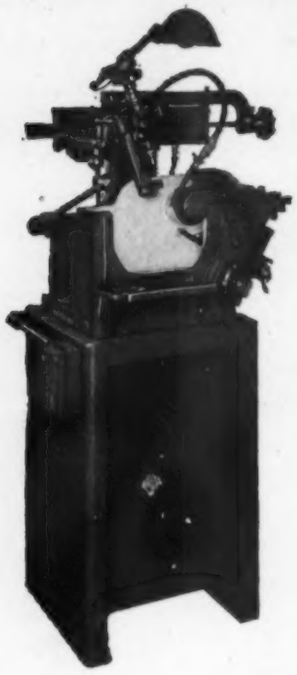

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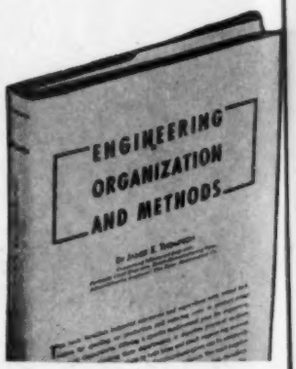

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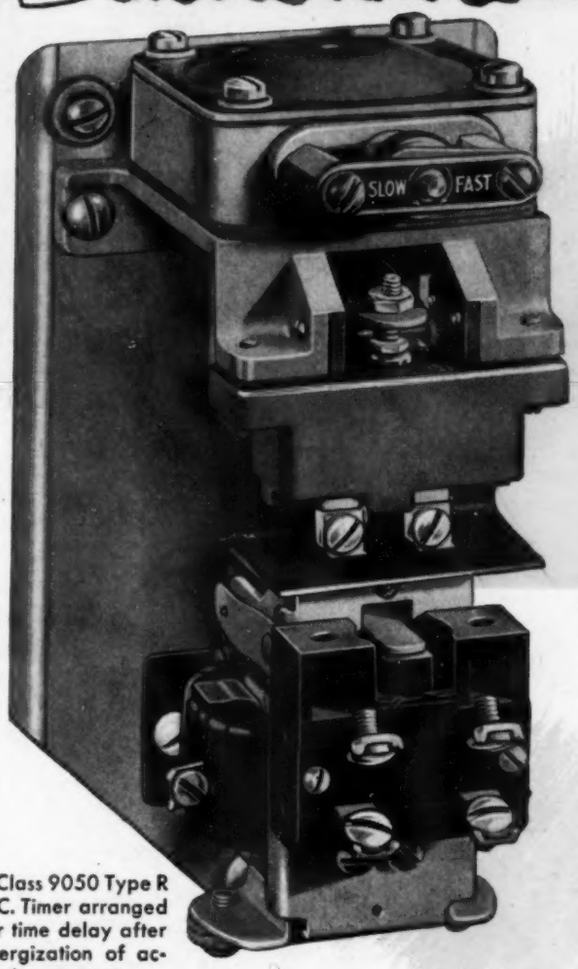

Class 9050 Type R A.C. Timer arranged for time delay after energization of actuating magnet

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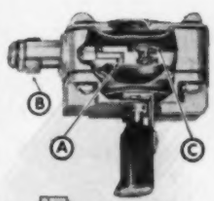

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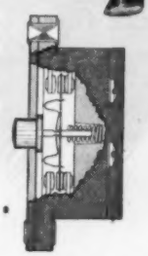

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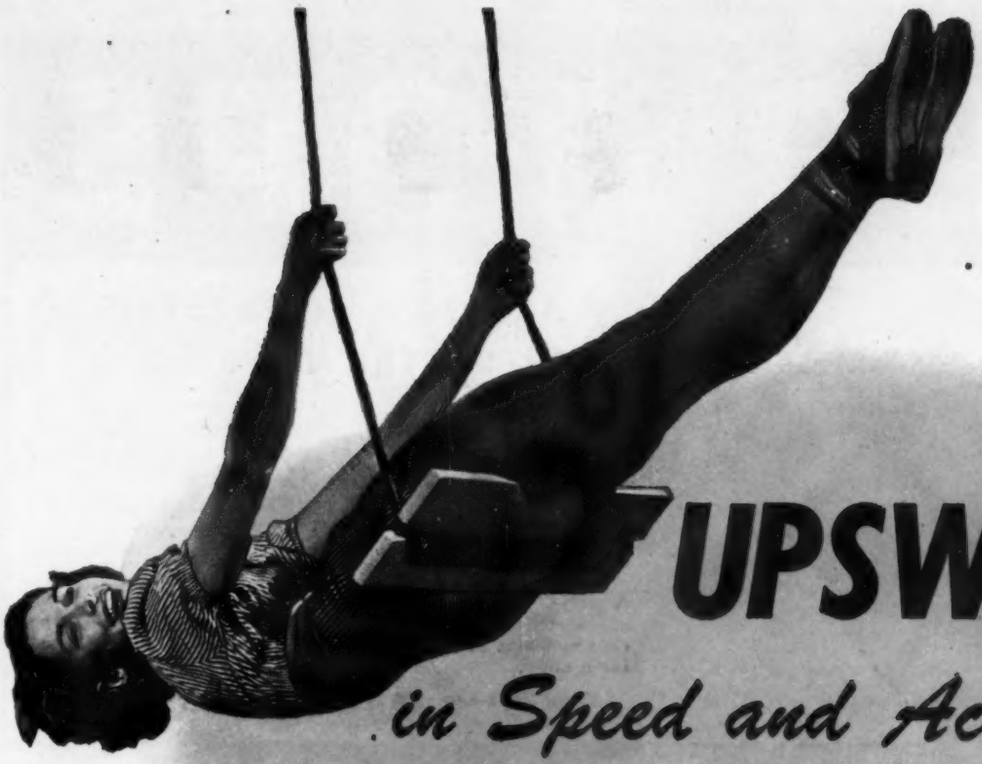

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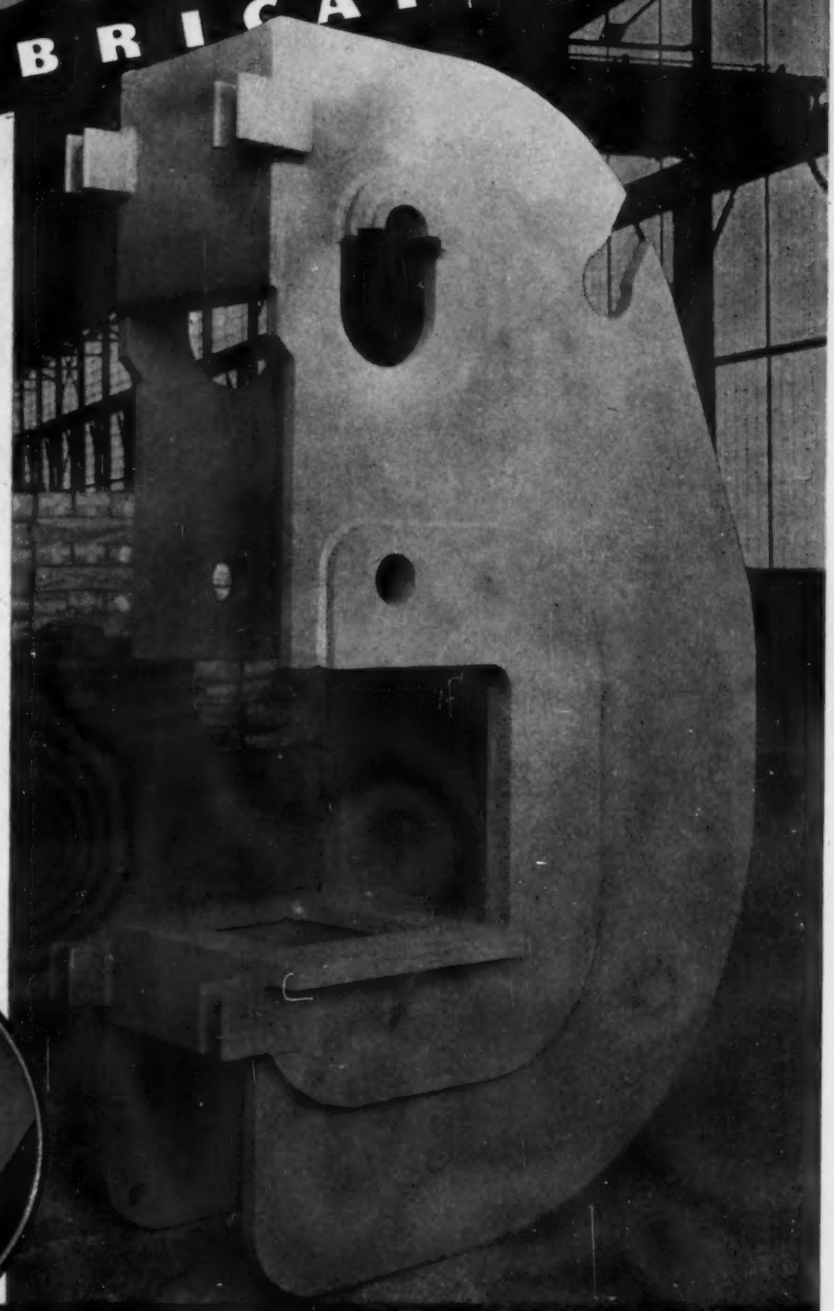

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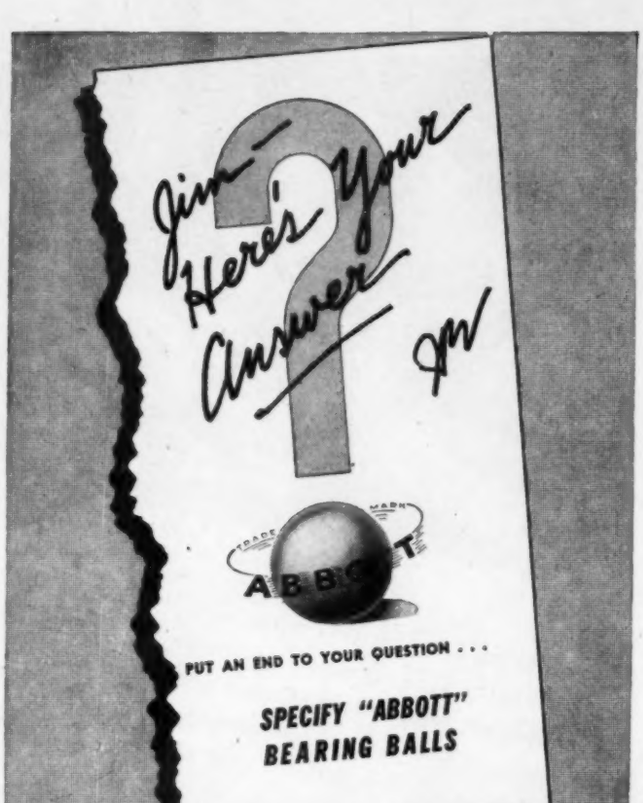


KEYSEATING

The Modern Way

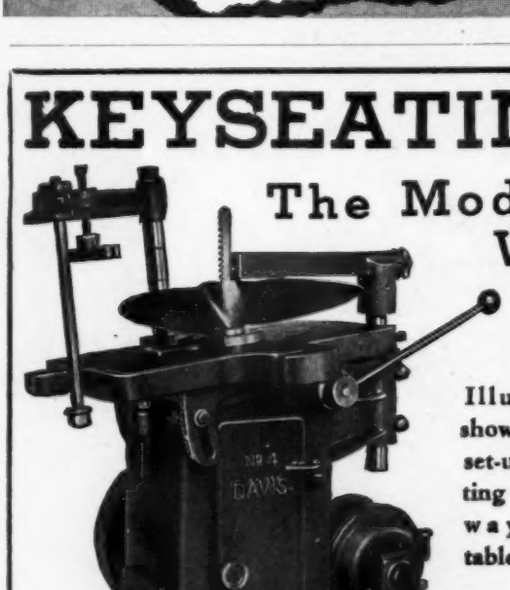


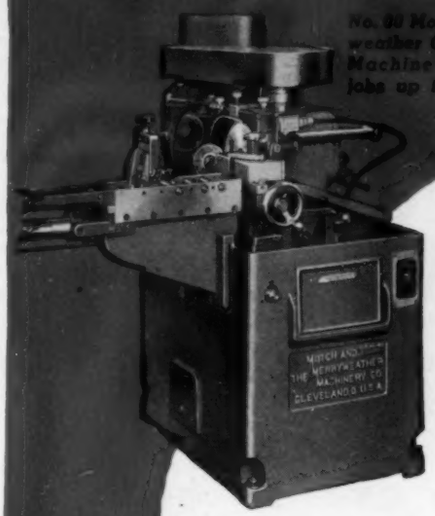
Illustration shows typical set-up for cutting taper keyway with table tilted.

Machines are made in three sizes for keyways 1/16" to 1¼" in width.

Great simplicity and ease of operation of Davis Keyseaters assure the user of accurate, time saving work.

Let our engineer study your keyseating problems.

DAVIS KEYSEATER COMPANY
403 EXCHANGE ST. ROCHESTER 8, N. Y.

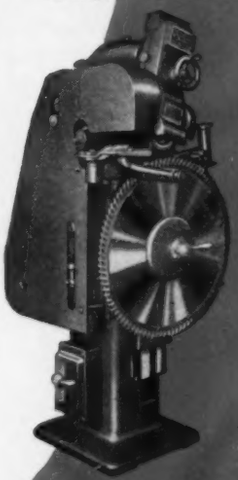


No. 00 Motch & Merryweather Cold Sawing Machine for small jobs up to 2".

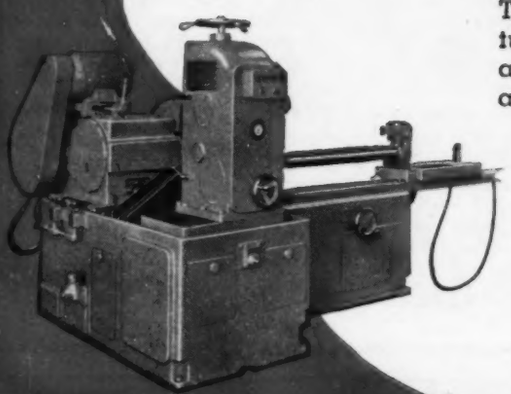
Triple-Chip METHOD

Bring Down Your Cut-Off Cost!

No. 1 Automatic Blade Sharpener, also No. 12 for smaller blades; impart correct, cam-generated tooth form to Triple Chip Blades.

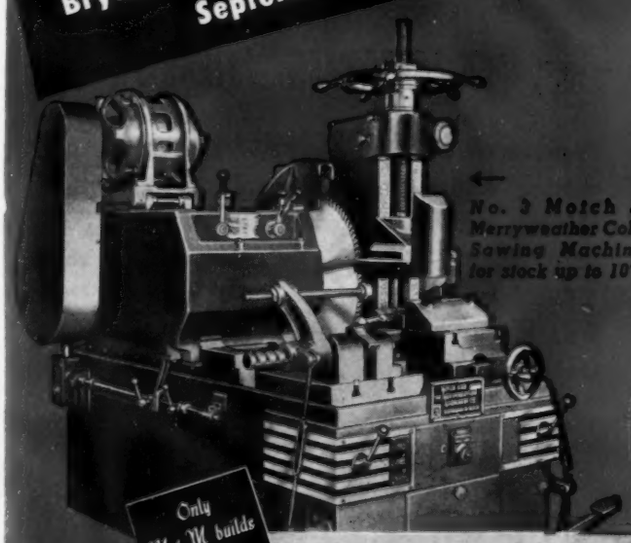


● Cutting off is regularly the most expensive operation on the finished part. Let the Motch & Merryweather Triple-Chip Method bring that cost tumbling down. Here is your *complete* answer—complete in terms of speed, accuracy, uniformity, and sharp, burrless cutting. Exceptional sawing performance is adapted to your requirements by an engineering background of many years given to "building all three": saw, blade, grinder. We'll be glad to talk with you about it in Chicago.

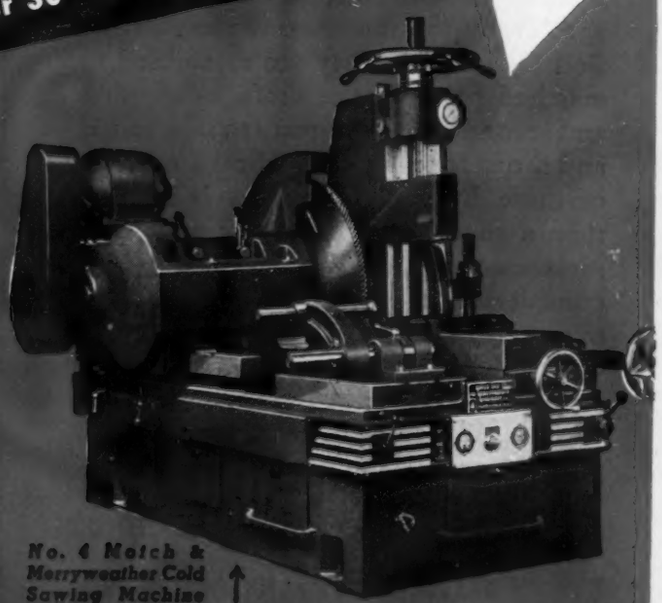


No. 2 Motch & Merryweather Cold Sawing Machine for stock up to 6".

See us in Chicago in the Demonstration Room of our Chicago representative, Bryant Machinery & Engineering Company · 6500 West Washington Boulevard — September 15 through September 30 — 10:00 a. m. to 9:00 p. m.



No. 3 Motch & Merryweather Cold Sawing Machine for stock up to 10".



No. 4 Motch & Merryweather Cold Sawing Machine for 16" stock.

Only M. & M. builds ALL 3: CIRCULAR SAW · SAW BLADE · BLADE GRINDER

THE MOTCH & MERRYWEATHER MACHINERY CO.

PENTON BUILDING — CLEVELAND 13, OHIO

SMALL... extra payload SIZE

THAT'S an exact description of these BCA ball bearings. BCA designed them specifically for the transmission of the Bell Helicopter. They are assembled in matched pairs on the shafts of the first and second planetary gears to take radial and thrust loads in either direction. Each of these BCA ball bearings is smaller than a silver dollar, yet they withstand service conditions that normally call for considerably larger bearings. Inner and outer races are matched to 1/10,000 of an inch.

Whether your applications call for custom built or standard ball bearings, get in touch with BCA—industry's headquarters for soundly engineered ball bearings since 1897.

BCA BEARINGS COMPANY OF AMERICA
LANCASTER, PA.

BCA RADIAL-ANGULAR CONTACT-THRUST BALL BEARINGS

Almond Drill Chuck

The Original Manufacturers of Drill Chucks

. . . for over 70 years

ALMOND THREE-JAW DRILL CHUCKS—the first to be placed on the market more than seventy years ago—pioneered the field of drill chucks. During all these many years, ALMOND CHUCKS have continued to be a necessary part in the logical procedure of machine developments.

Made in types and sizes to fit all machine tools and portable drills.

Write for further information.

T. R. ALMOND MFG. CO.
Ashburnham, Mass., U.S.A.

the "swing" is to

SPECIAL MACHINERY

the "orders" are going to —

"COLUMBUS DIE-TOOL"

Because we have specialized for years in designing and building special purpose machinery, our "know-how" is unequalled. WE HELP KEEP YOU KEEP AHEAD OF COMPETITION by designing the right machine for the job. Send us your special machinery and tooling problems.

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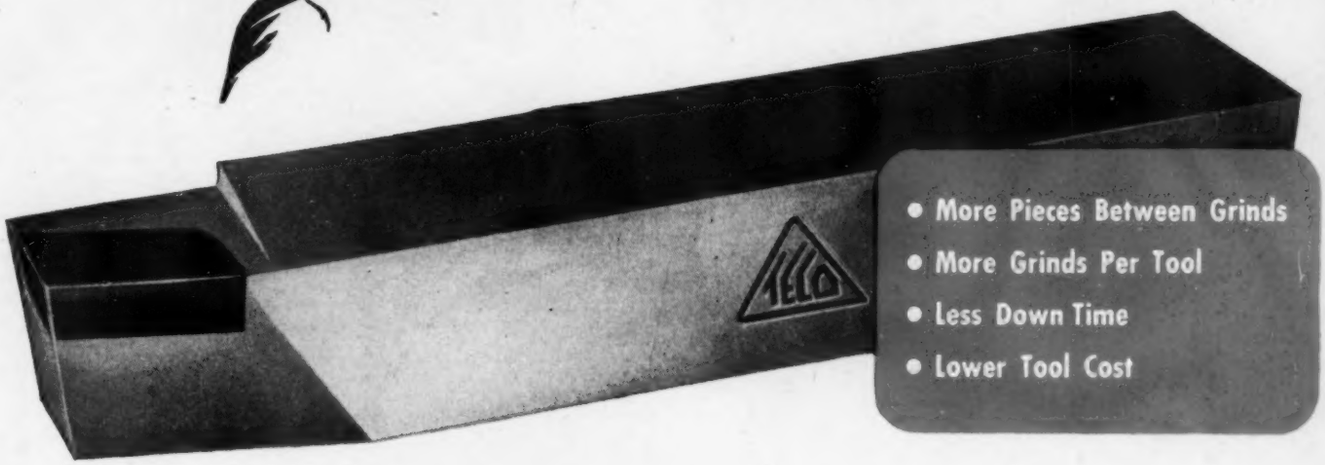
BUILDING COMPLETE MACHINE TOOLS
UNITS FOR MACHINE TOOLS
PUNCHES AND DIES

COLUMBUS DIE-TOOL and Machine Co.
940 CLEVELAND AVE.
COLUMBUS 1 OHIO

"It's like adding 'extra' machines"

--since we tooled up with *Improved* TECO Cemented Carbide



- More Pieces Between Grinds
- More Grinds Per Tool
- Less Down Time
- Lower Tool Cost

A TYPICAL CASE

Part: Carrier spindles
Machine: Bullard 30" V. T. L.
Material: S. A. E. 1045 Steel
Operation: Turning
—diameter 4⅞"
—length 11⅝"
Depth of cut: .010" to ⅜"
Feed: .021"
Speed: 230 ft. per minute
Pieces between grinds: 26 (no breakage)
Average number of grinds: 30 per tool (tip 1" long)
Best previous carbide: 7 to 8 pieces

IMPROVED TECO is setting new records of carbide performance in turning, boring and facing operations. Enthusiastic users continue to report production increases of 3 to 10 times over carbides formerly used. The case shown is a typical example of how a plant increased output per machine and reduced cost per piece simply by switching to Improved TECO. Chances are that you can make similar gains. It's well worth finding out.

Just do this! Tool up any regular carbide job with Improved TECO Cemented Carbide. Run under identical conditions. Then compare your pieces per grind—grinds per tool—pieces per tool—tool cost. Also note Improved TECO's exceptional performance at higher speeds and feeds.

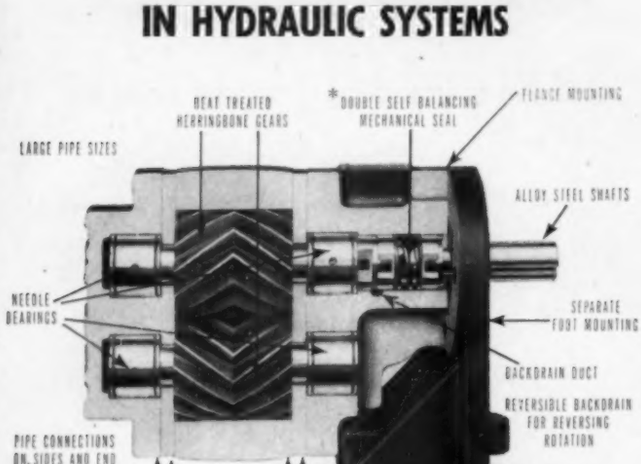
Send us details of your machining problem for recommendation. Our tool engineers are glad to discuss your needs. Latest catalog and price list sent on request.

TUNGSTEN ELECTRIC CORPORATION
568 39th STREET, UNION CITY, N. J.
Branch Office: 403 Western Reserve Bldg., Cleveland 13, Ohio
Representatives: Indianapolis, Ind., Detroit, Mich.

Improved TECO CEMENTED CARBIDE

14 Pointers

to BETTER PUMP PERFORMANCE IN HYDRAULIC SYSTEMS



THE 14 FEATURES pointed out in this diagram present the real reasons for the superior performance of *Brown & Sharpe 500 Series Rotary Geared Pumps.* They are responsible for the quiet, efficient, dependable service which these pumps provide throughout years of operation, with a minimum of maintenance.

500 Series Rotary Geared Pumps are suited for service with pressures up to 500 lbs. per square inch. Operating speeds permit direct motor drives. Six sizes with capacities from 5.1 to 37.6 G.P.M. at 0 lbs. pressure. Get all the details. Write Brown & Sharpe Mfg. Co., Providence 1, Rhode Island, U.S.A.

**In all pumps of 500 Series except Nos. 507 and 511.*

B·S

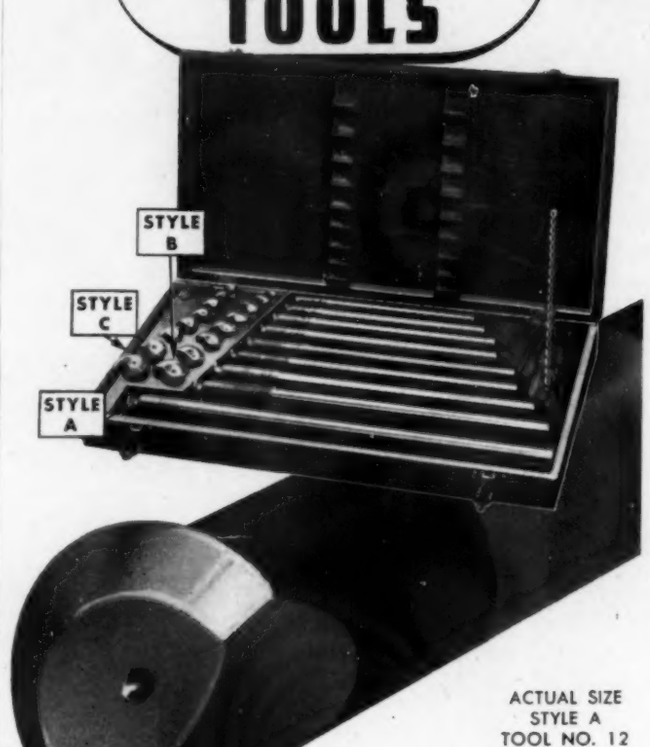
500 SERIES
ROTARY GEARED PUMPS

We urge buying through the Distributor.

GEARED • VANE • CENTRIFUGAL • MOTOR DRIVEN

BROWN & SHARPE PUMPS

BOKUM BORING TOOLS



ACTUAL SIZE
STYLE A
TOOL NO. 12

Let us make up a handy box of large boring tools of your own selection of sizes and styles. The box accommodates nine sizes of high-speed cutting heads in each of the three styles interchangeable on the threaded shanks also furnished.

HERE'S THE TOOL for Boring Large Holes

FAST — ACCURATE — EFFICIENT

It takes heavier bites—permits faster feed—doesn't chatter. Has great advantage over forged tool or boring bit. Has longer life. You regrind only one face. You'll never use any other boring tool, once you start using Bokum.

STYLE A—for general boring
STYLE B—for bottoming and facing
STYLE C—for internal threading

Ask for catalog K-1139 for high speed steels—catalog K-398 for carbide tipped

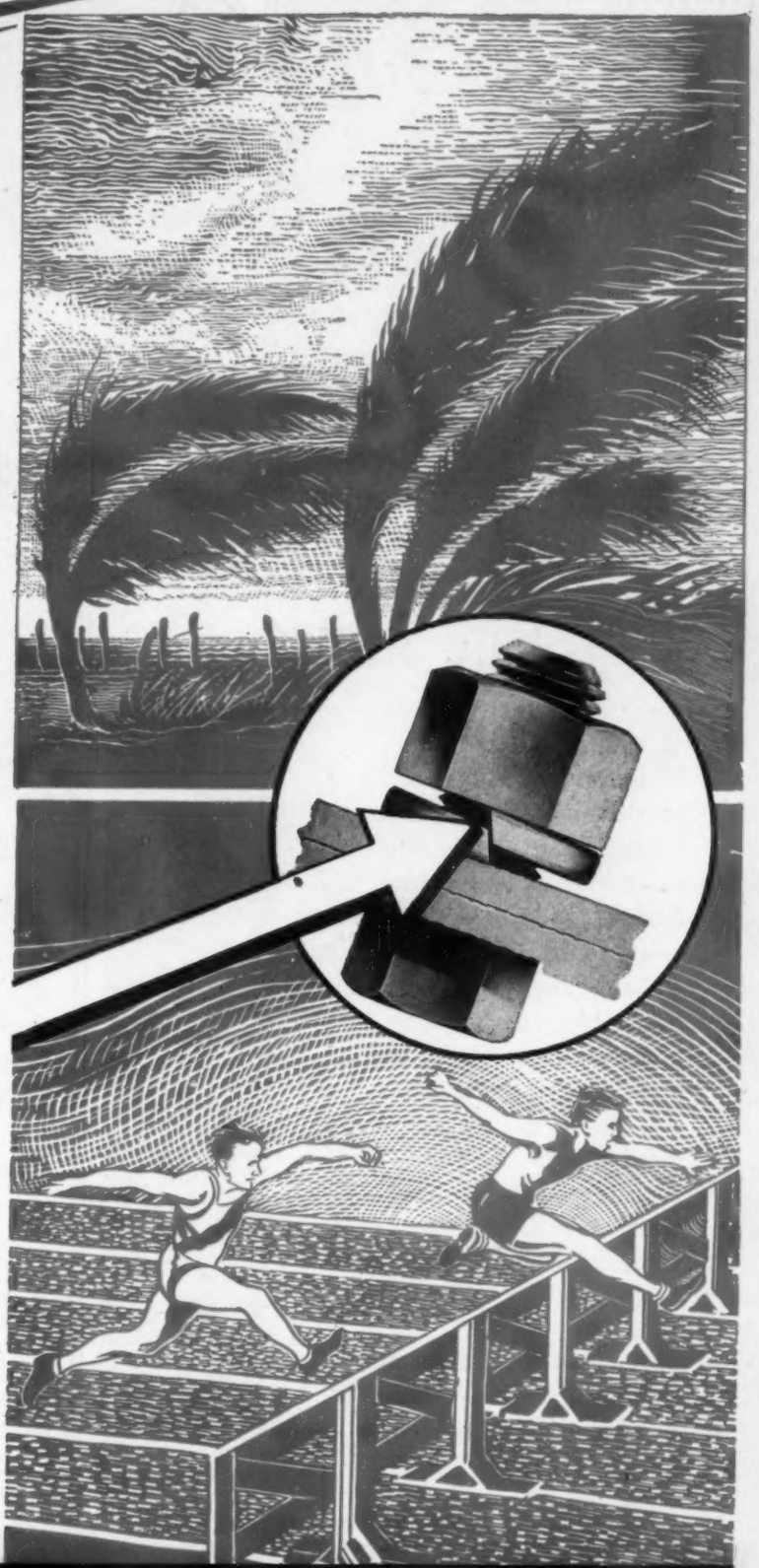
TRADE MARK REG. U. S. PAT. OFF.

BOKUM TOOL CO.
14775 WILDEMERE AVE. · DETROIT 21, MICH.

SINGLE POINT BORING TOOLS—INTERNAL THREADING, BOTTOMING AND FACING TOOLS—CARBIDE TIPPED TOOLS

The SPRING IS THE SECRET

—WITH TREES
—WITH MEN
—WITH ALL
BOLTED ASSEMBLIES



Unless trees were natural springs, every high wind would snap them off.

Unless your body had plenty of spring action, you'd jounce yourself to an early death—jumping, running or even walking.

Unless your bolted assemblies have spring action they'll inevitably jounce and wear themselves loose. The spring in Kantlink spring washers eases all shocks and all wear. It's the spring that compensates for initial looseness caused not only by wear of metal on metal, but by bolt stretch, by rust, flares, etc.

A tight nut, even though it never turns a hair on the bolt, is not enough to stop the other parts from wearing loose.

You must use a spring—there is no substitute.

For real bolted security specify Kantlinks.

Send today for descriptive folders.

Originators of

KANTLINK

the long-range spring washer

Made to accord with the new ASA specifications

THE NATIONAL LOCK WASHER COMPANY

Newark 5, New Jersey — Milwaukee 2, Wisconsin

do you have a

HANDLING PROBLEM?

...*use* Ford Triblocs

Wherever you make things or repair things, you have to *move* things. That's what we call a "handling problem." And if what you have to move doesn't weigh more than 40 tons, chances are we can help solve your handling problem. FORD Chain Hoists and Trolleys are well-designed —with fewest possible moving parts. And they're ruggedly built—for hard work and lots of it. Capacities from 250 pounds to 40 tons.

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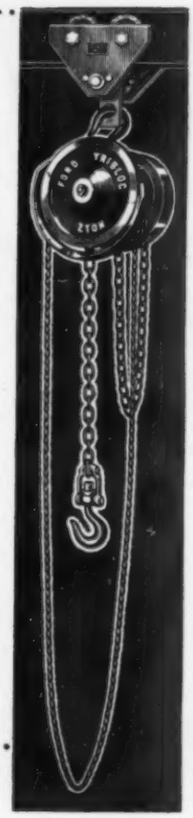

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AMERICAN CHAIN & CABLE

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DIE CUSHIONS THAT MODERNIZE YOUR DIE CONSTRUCTION AND DESIGN

ADAPTABLE TO ALL DEEP DRAWING PRESS OPERATIONS.

Self-contained unit, quickly installed on any punch press.

Furnished with hardened and ground pin pressure pad.

DIE CUSHION PISTON DIAMETER	5"	6"	8"	10"	12"	14"	16"
MAXIMUM DRAW	2"	2½"	3"	3"	3"	4"	5"
DRAW RING HOLDING PRESSURE (in tons)	.9"	1.4	2.5	3.9	5.7	7.7	10.0
SHIPPING WEIGHT (approx. lbs.)	66	138	150	200	310	450	650

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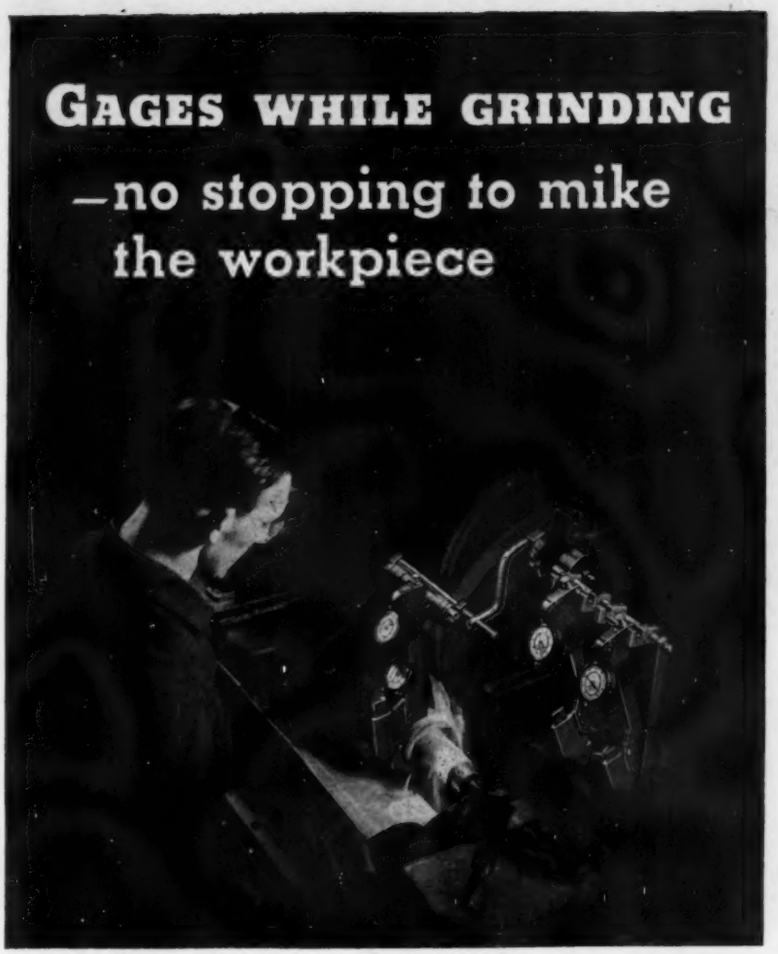
AMERICAN MACHINIST
330 West 42nd Street New York 18, N. Y.

GAGES WHILE GRINDING

—no stopping to mike the workpiece



Increases production as much as 100%

Gage rides on the work throughout the grinding operation.

1947 MACHINE TOOL SHOW
CHICAGO SEPT 17-26

Visit Booth 47 — to see newest developments in Air, Electronic, Mechanical Gages.

Gage lifted out of way while work is placed or removed from machine.

Prevents oversize regrinds and undersize rejects

WHEN your grinding machine is never stopped to check the size of the work in process, your hourly output increases . . . the cost per piece decreases. *That happens when you install a Federal-Arnold Continuous Grinding Gage.*

This gage controls dimensions at the machine *while the work is being ground.* You put the gage on the rotating workpiece and leave it there; you do not hold it on the work; there is no stopping to mike or gage for size.

The operator requires no unusual skill or training; he merely watches the Dial Indicator until the piece is finished. When the Dial Indicator says the work is to size, *it is to size.*

Attach an Arnold Gage to a grinder and you see immediate results. You eliminate oversize regrinds and undersize rejects . . . save many a dollar otherwise lost in scrap. Even on short runs, this saving in scrap and the increase in output pay for your Arnold Gage in a very short while. Actual records show production increases as high as 116%.

This instrument is easily installed; is sturdily constructed to assure long life and continued accuracy. The contact points are made of tungsten carbide.

You can use Arnold Gages to check straight, tapered or splined diameters; widths between or over shoulders; combined diameter and width. Let a Field Service Man show you the applications to your grinding operations. Write us for illustrated Bulletin No. 61.

FEDERAL

FEDERAL PRODUCTS CORPORATION
1144 Eddy St., Providence 1, R. I.

● Dimensional Dial Indicators and Indicating Gages — mechanical, electronic, air, multi-dimensional • Automatic Sorting • Dimensional Machine Control • Combinations of these methods. For the Mechanical, Textile, Rubber, Paper and all industries requiring dimensional accuracy.

Hammond of KALAMAZOO
GOOD MACHINERY SINCE '82

Not "Just Lathes"...but

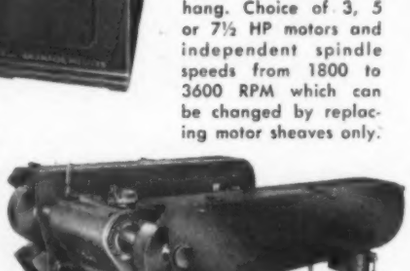
HIGH-PRODUCTION FINISHING UNITS

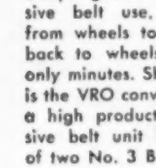
Single or Double Spindle Variable or Single Speed

MODEL VRO
The much-in-demand Variable Speed, Ball Bearing Polishing and Buffing Lathe for average work needs. Provides spindle speed changes from 1500 to 3000 RPM while lathe is in operation. Features motor-in-base, V-belt drive, 8" spindle overhang, choice of 5 or 7½ HP motor.

MODEL RRO
Popular two-spindle, two motor ball bearing model with motors in base, multi-V-belt drive and 8" spindle overhang. Choice of 3, 5 or 7½ HP motors and independent spindle speeds from 1800 to 3600 RPM which can be changed by replacing motor sheaves only.

No. 3 BACKSTANDS
Hammond Backstands increase the work range of standard grinding and polishing equipment by adapting them to abrasive belt use. Changes from wheels to belts, or back to wheels, require only minutes. Shown here is the VRO converted into a high production abrasive belt unit by means of two No. 3 Backstands.





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THE W&B CO.
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Twice as many pieces per dressing with Economy Lubricant 1888

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"We get twice as many pieces per dressing with the 1888 compound as we did previously using soluble oil and water."

ECONOMY LUBRICANT 1888 is detergent —keeps grinding wheels more open and free-cutting— increases production.

THE WHITE & BAGLEY COMPANY
WORCESTER, MASS. • DETROIT, MICH.
Original Producers of Grinding Lubricant

CUT SMALL HOLE TAPPING COST

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With the *new* and *improved* ERRINGTON "Cushion" Cone High Speed Tapper with the 2:1 reverse.

Ball & Bronze bearing throughout.

Taps to 3/16 in steel, ¼ in cast iron.

Also: Multiple drilling & tapping attachments, auto opening dieheads, clutch tappers to 2" taps.

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Established 1891

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- Reams
- Taps
- Drives and removes screws
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Uses standard attachments

Powered with special, reversible universal electric motor... plug into any wall socket... no torque reaction to the operator... takes the drudgery out of a multitude of maintenance and production jobs*... see our nearest branch office or distributor.

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TAPER MASTER *makes taper cutting EASIER!*

- Cuts tapers from 1/1000 to 4 inches per foot
- Micrometer adjustment down to 1/1000 of an inch
- Positive Center Lock, keeps center to micrometer accuracy at all times
- Easy to set up and adjust; requires a minimum of make-ready time
- Fits any standard Morse Taper lathe.

TAPER MASTER fills a long felt need for a simple, practical taper device that is durable, accurate and light weight. It is easily handled by one man.

Accuracy and Speed for One or a Number of Similar Tapers.

TAPER MASTER is made in three sizes:

The No. 2 TAPER MASTER is intended for home shop and light experimental work. It cuts tapers up to 2½ inches per foot.

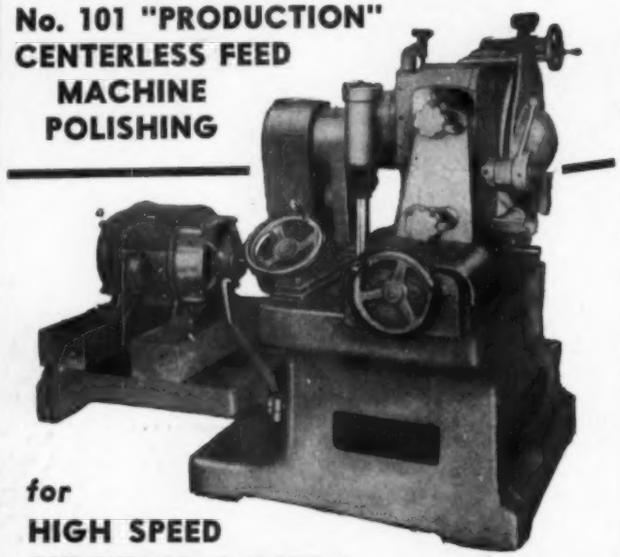
The No. 3 TAPER MASTER is intended for manual training and trade school use, heavy duty tool room or industrial use, and for experimental work shops. It cuts tapers up to 3¼ inches per foot.

The No. 4 TAPER MASTER is intended for heavy duty work in tool rooms or for industrial production setups. It cuts tapers up to 4 inches per foot.

Write for prices and taper desired.

National Distributor
THE MACHINERY AND FACTORY EQUIPMENT CO.
1215 Douglas Avenue — Racine, Wisconsin

No. 101 "PRODUCTION" CENTERLESS FEED MACHINE POLISHING



for
HIGH SPEED CYLINDRICAL WORK

Work may be fed through this machine even with inexperienced labor and a superior finish obtained at fastest feed speeds. Any grade of finish on cylindrical work is assured at lowest cost. A patented Centerless Feed of the Roll Type is available for handling taper cylindrical work. The No. 101 machine is made also with two or more units in tandem for multiple finishing.

Illustrated literature available on request

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PERMANENT PERFORMANCE

- Kester Cored Solders are scientifically manufactured to provide permanent, dependable results in every type of soldering operation. They equip your product with rugged staying power—protect against service difficulties.
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- Kester Rosin-Core Solder, for electrical work, contains a patented plastic rosin flux. Ideal material for clean, tight electrical connections, Kester Rosin-Core Solder will not cause corrosion or injure insulation.
- For general soldering, use Kester Acid-Core Solder to safeguard the equipment you build . . . with tight, trustworthy solder bonds.
- Kester engineers are at your service, to help you select the right solder, and the correct strand and core-size for every operation. Write them fully; there is no obligation.

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Cored Solders
STANDARD FOR INDUSTRY

SHIELD BRAND VALUES

1. DESIGN

Every proven principle of successful tool engineering is applied in the design of Shield Brand Tools to permit maximum speeds and feeds in production.

2. CONSTRUCTION

The most modern facilities for machining, heat-treating, and testing, plus the use of finest steels in each class of Shield Brand Tools, results in unexcelled uniform quality.

3. COST

The true measure of the cost of a tool is arrived at by the formula (first cost + maintenance cost + cost of lost time due to work interruption) ÷ useful production of the tool. Shield Brand Tools thus measured provide the ultimate in tool economy.

4. AVAILABILITY

Leading Mill Supply Distributors in all manufacturing centers, coast to coast, supply Shield Brand Tools. Our factory stock of over 10,000 items permits the most complete and rapid service to users.

5. KNOW HOW

Our 66 years of experience in supplying Drills, Reamers, Taps, Dies, Milling Cutters and Special Tools to America's leading industries gives us a wealth of information on metal working problems. This is available to all users of Shield Brand Tools, on request.

Send us your tough jobs. We will provide the proper Shield Brand Tool to solve the problem.

STANDARD TOOL CO.

THE STANDARD TOOL CO.

CLEVELAND

Warehouses: New York · Detroit · Chicago

Standardize

HIGHLY DESIRABLE
WIDELY ATTEMPTED

A specific suggestion results in economy

THE SUGGESTION:

Standardize on Shield Brand Drills, Reamers, Taps, Dies, Milling Cutters and Special Tools.

RESULTS IN SAVING:

Saves time in purchasing.
Saves time in stock keeping.
Saves time in the tool crib.
Saves time in setting up work.
Reduces cost in production.

REASONS WHY:

One source of supply—instead of many, with ample facilities to meet all your requirements.

Uniform operating characteristics of Shield Brand Tools.

Low service cost of Shield Brand Tools plus unexcelled service of supply.

Call your Mill Supply Distributor.

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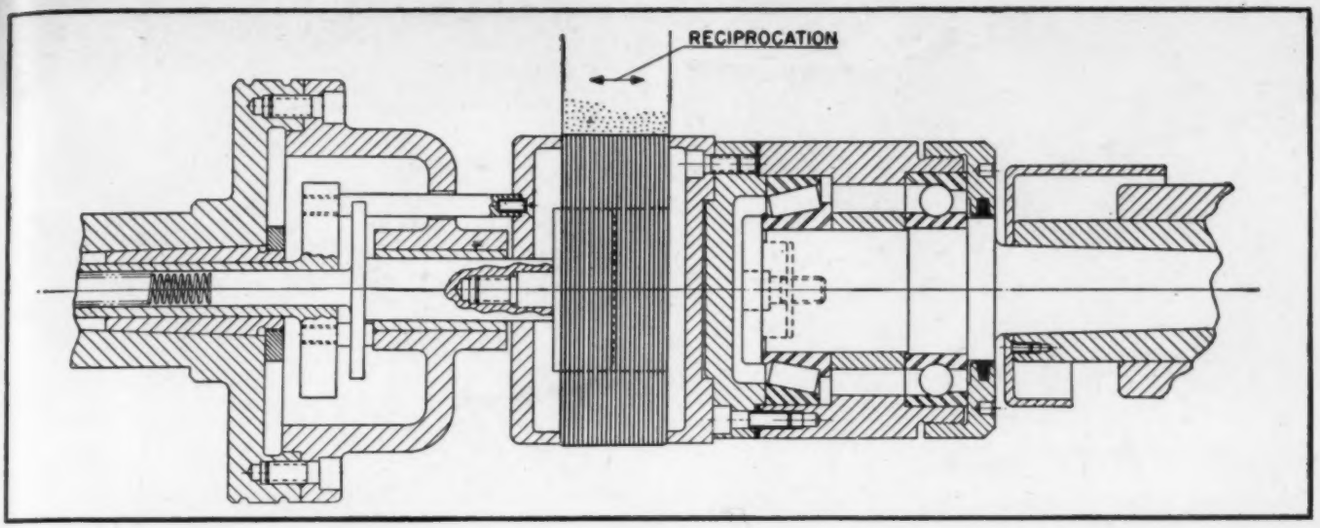

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THIS IS THE MACHINE...

Profitable Cylindrical Grinding by the FITCHBURG "Push-Button" method

Grinding the O.D. (4.375 ± .002") of Laminated Stator Cores

THE WORK:

Two FITCHBURG 6" x 24" Bowgage Plunge-Cut Grinders, Center Type, are being used in the plant of a motor manufacturer to grind the outside diameters of stator cores. The cores consist of punchings riveted together, the inside diameter being previously ground on another machine.

As shown above, centering is accomplished by sliding the core onto a spring-loaded centering plug. The headstock holding and driving fixture is a hydraulic type which equalizes the holding pressure and maintains the core in the correct grinding position relative to the wheel.

The ball-bearing tailstock center is attached to a hydraulic footstock. Adapters grip the punchings almost to the outside edge to prevent flaring of the punchings during the grinding operation.

WHAT THE OPERATOR DOES:

1. Slides the core onto the centering plug.
2. Throws over a hydraulic footstock hand valve. (This advances the tailstock center and causes the adapters to grip the punchings.)
3. **Pushes the "START" button** and turns to a *second* similar machine.

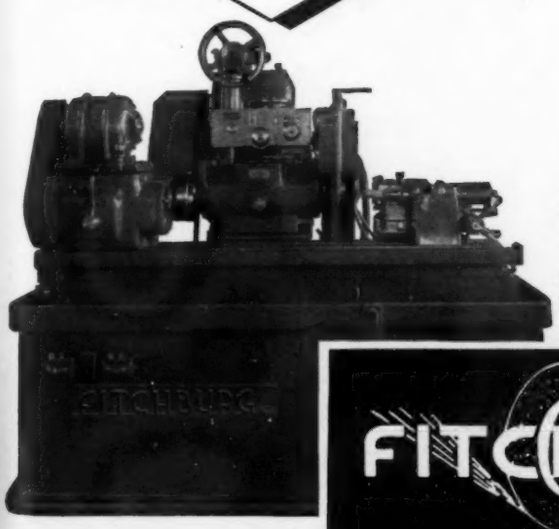
WHAT HAPPENS AT THE PUSH OF A BUTTON:

1. The work *automatically* starts revolving.
2. The Bowgage Wheelhead Unit *automatically* goes through its complete cycle:
   a. Wheel rapidly traverses to the work.
   b. Grinding feed diminishes as final size is reached.
   c. Wheel reciprocates 1/32" during entire cycle.
   d. Wheel rapidly returns to starting position.
   e. Wheelhead controls reset themselves *automatically* for the next complete cycle.
3. As the wheel draws away, the work *automatically* stops rotating. (Throwing the hydraulic footstock hand valve draws the tailstock away from the work, allowing the work to be removed and the next piece slid onto the centering plug.)

ONE OPERATOR CAN EASILY RUN 2 GRINDERS.

THIS PRODUCTION IS ON A 25 SECOND CYCLE, PER MACHINE — OR 300 PER MAN-HOUR.

If it's round ... and to be ground ... in mass-production quantities ... at a low cost per piece ... investigate FITCHBURG'S "PUSH-BUTTON" GRINDING.



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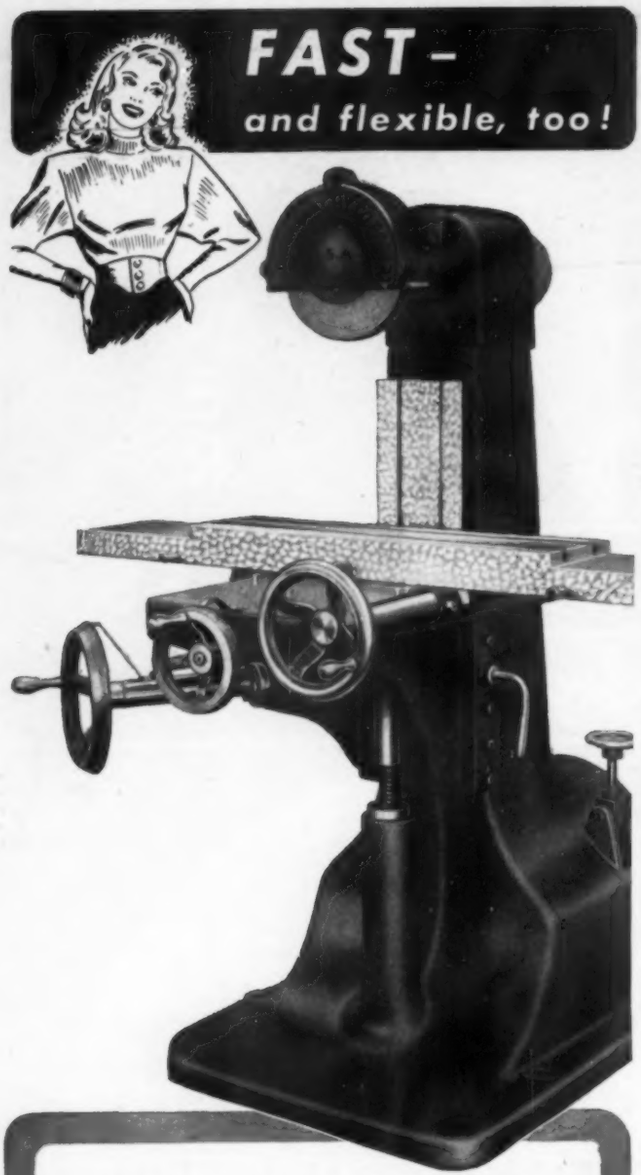

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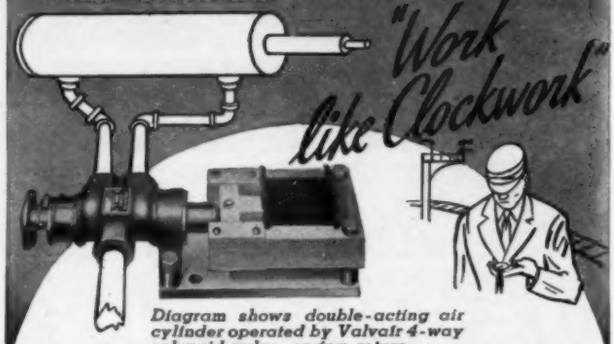

Diagram shows double-acting air cylinder operated by Valvair 4-way solenoid valve, spring return.

DEPENDABILITY — That's outstanding in Valvair performance. Solenoids are Stellite-welded to resist wear; do not mushroom. Standard Valvairs have operated over 2,000,000 times at 100 lbs. with never a leak. *Exclusive features.* Patented basic design eliminates metal seats; non-corrosive (cast bronze body, stainless steel parts); full pipe area used with minimum drop. 2-way, 3-way, 4-way types. Get full details and prices.

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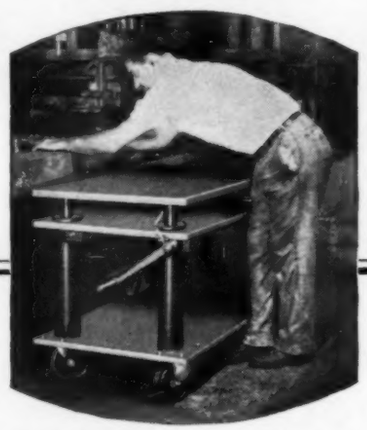
Valvair



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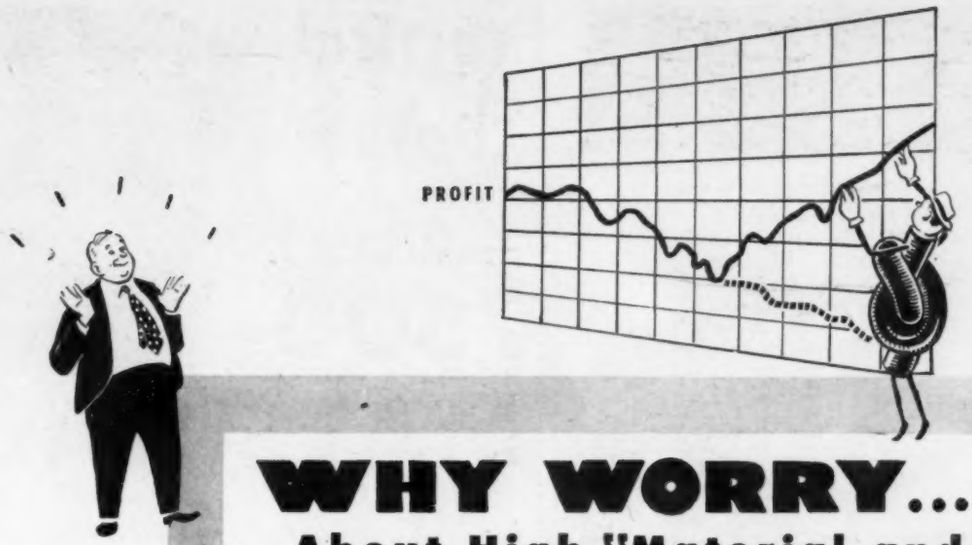

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ACTUAL PHOTOGRAPH

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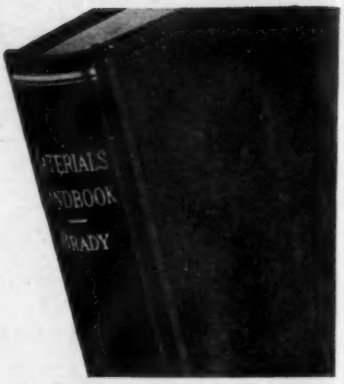

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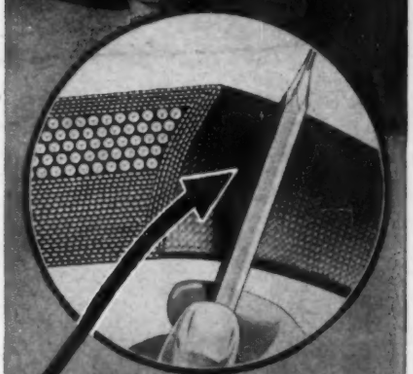
Only the SIDE of a V-Belt TOUCHES the Pulley

Diagram of V-Belt in Sheave Groove

The *SIDE* Does ALL the Gripping--
----Naturally it *GETS the WEAR!*

Every ounce of load a V-Belt *carries* must first be picked up by the sides of the belt. Clearly so, because *only* the *sides* touch the pulley! The sides do all the GRIPPING—they get all the WEAR against the sheave-groove wall. The sides pick up the load. They transmit that load to the belt as a whole. And then, once more, the sides—and the sides alone—grip the driven pulley and deliver the power to it.

No wonder you have always noticed that the sidewall of the *ordinary* belt is the part that *WEARS OUT FIRST.*



Now See How the Patented CONCAVE SIDE
* *SAVES Sidewall Wear and Lengthens Belt Life!*

Naturally, since the sidewall is the part that wears out first, anything that prolongs the life of the sidewall will lengthen the life of the belt.

The simple diagrams on the right show exactly why the ordinary, straight-sided V-Belt gets excessive wear along the *middle* of the sides. They show also why the Patented Concave Side greatly reduces sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belt can possibly give.

*Longer Sidewall Wear is MORE IMPORTANT NOW Than Ever Before!

Now that Gates *SPECIALIZED* Research has resulted in Super V-Belts capable of carrying much heavier loads—up to 40% *higher horsepower ratings* in some cases—the sidewall of the belt is called upon to do even more work in transmitting these heavier loads to the pulley. Naturally, with heavier loading on the sidewall, the life-prolonging Concave Side is more important NOW than ever before!

The CONCAVE SIDE is a GATES PATENT

Straight Sided V-Belt

How Straight Sided V-Belt Bulges When Bending Around Its Pulley

You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.

Gates V-Belt with Patented Concave Sidewall

Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley.

No bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall—and that means much longer life for the belt!

478

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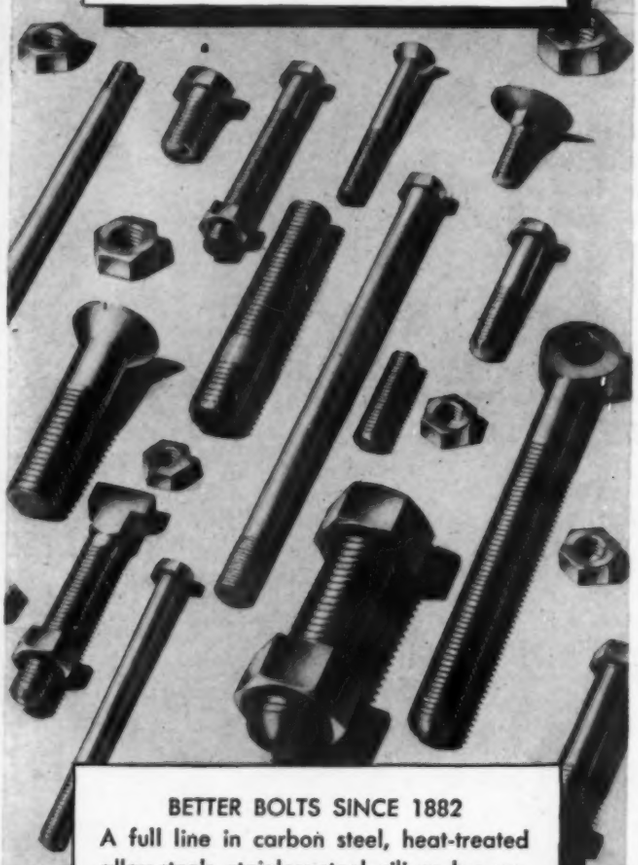

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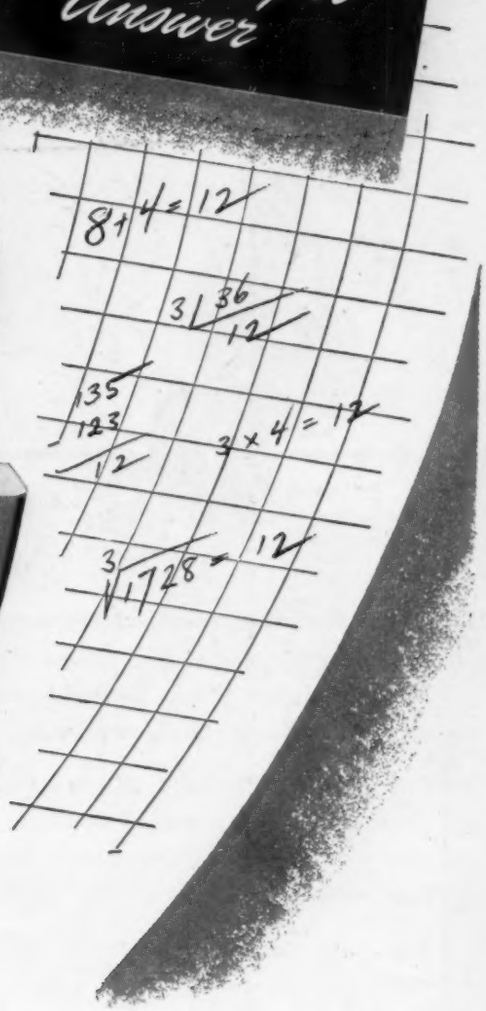

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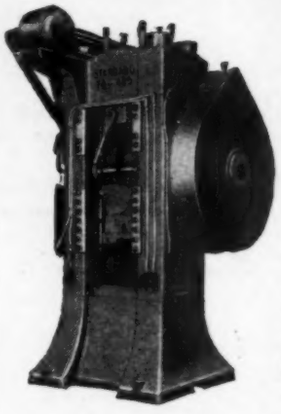

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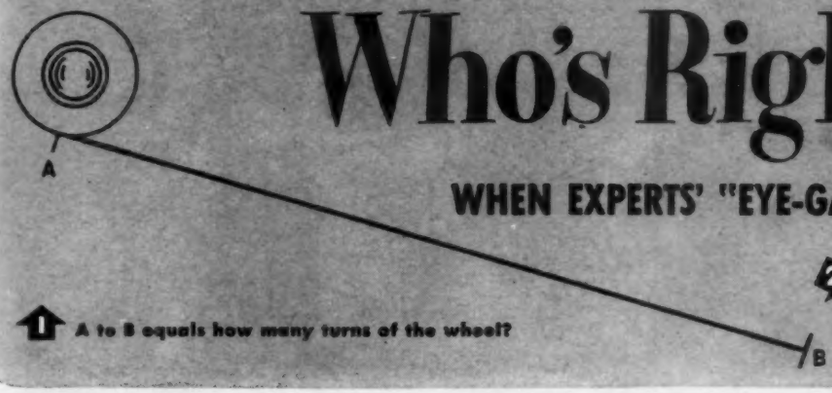
WHEN EXPERTS' "EYE-GAUGING" DISAGREES?



1 A to B equals how many turns of the wheel?

2 What size is this Socket Screw?

Answers:
1. Two turns.
2. No question if it's Size-Marked!

● In everyday shop practice, many problems arise that require "eye-gauging". Identifying the correct size and pitch of an ordinary socket head cap screw is one example. In recent tests, this simple question stumped many good mechanics. On the job, if they guessed, they'd chance errors and delays. Good workmen don't guess—they "mike" or gauge the screw—but that, too, takes *time*.

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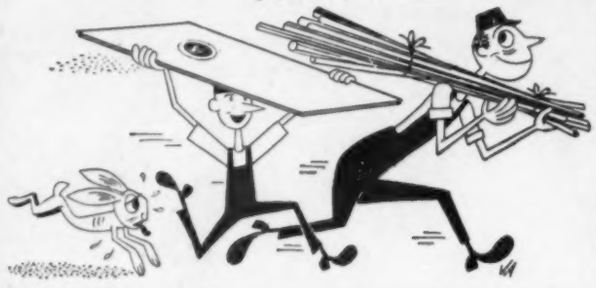

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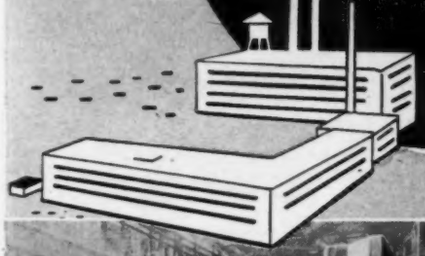
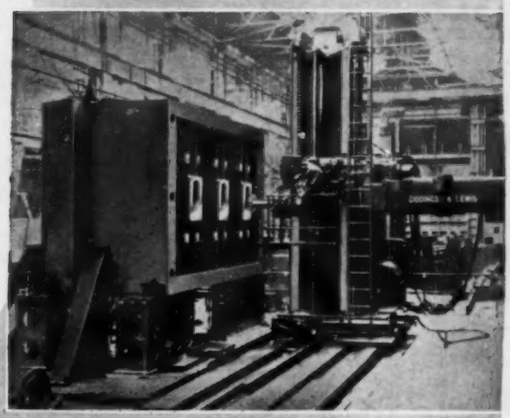


Face milling locking device cylinder seating on press bed.



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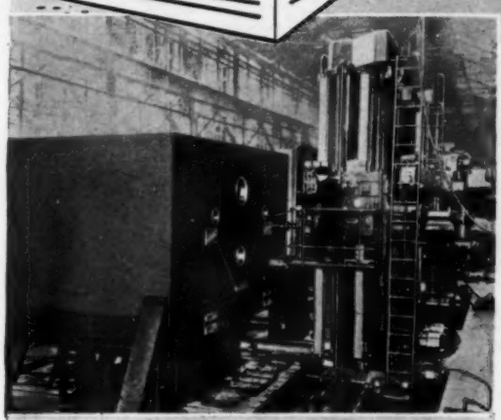
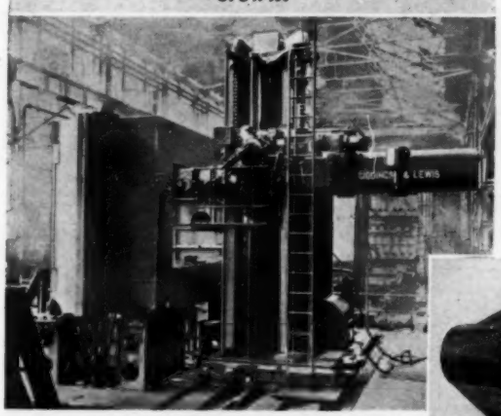
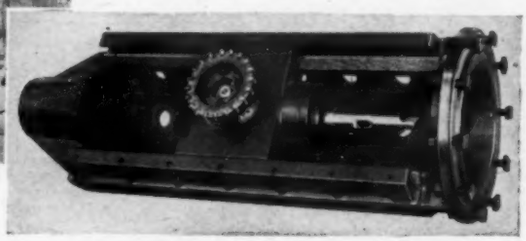


Drilling and tapping holes in press crown.



Milling slide guides in triple action press bed. (Inset milling attachment used.)



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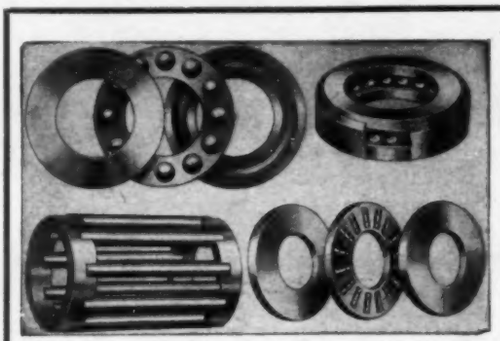

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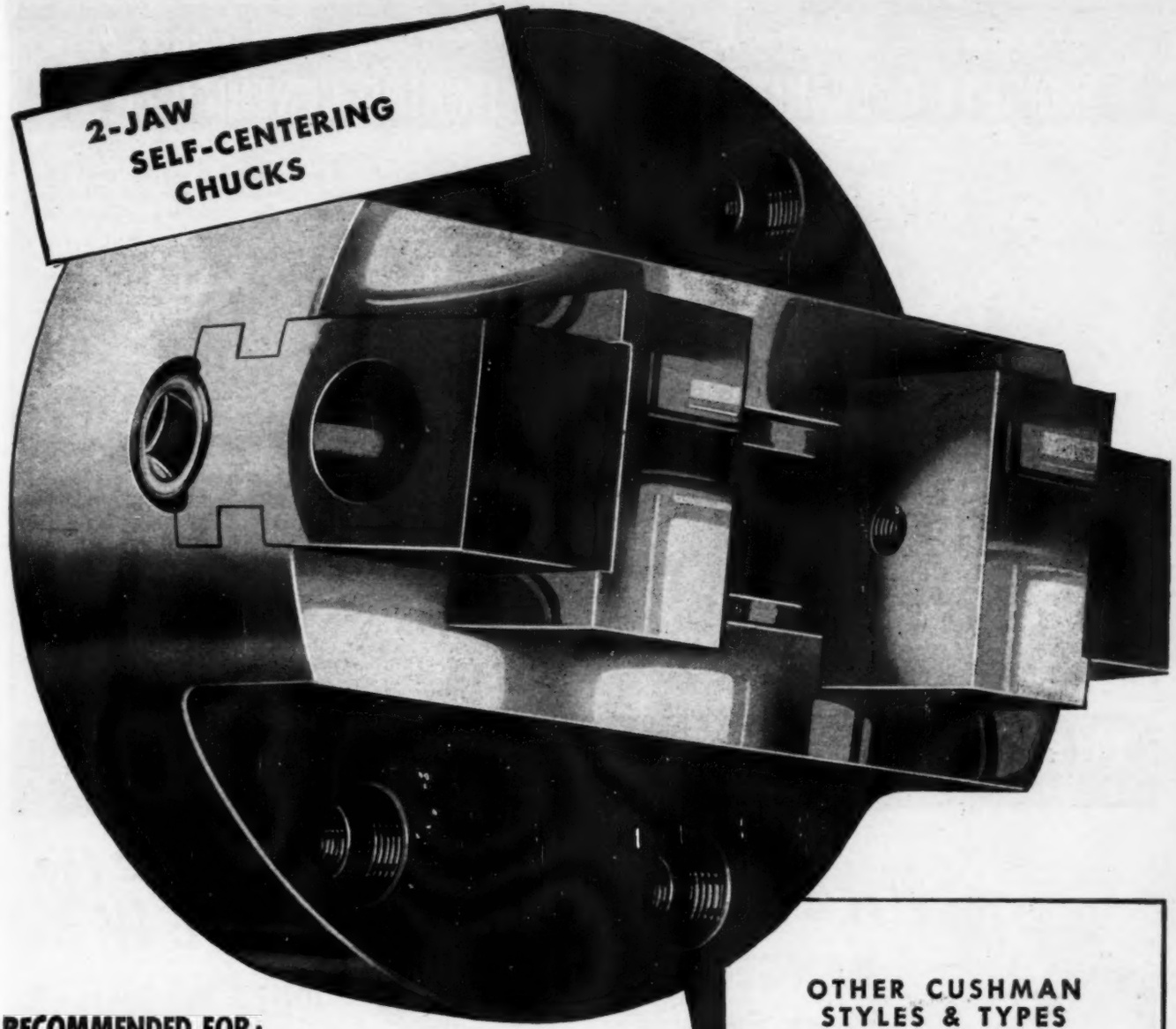

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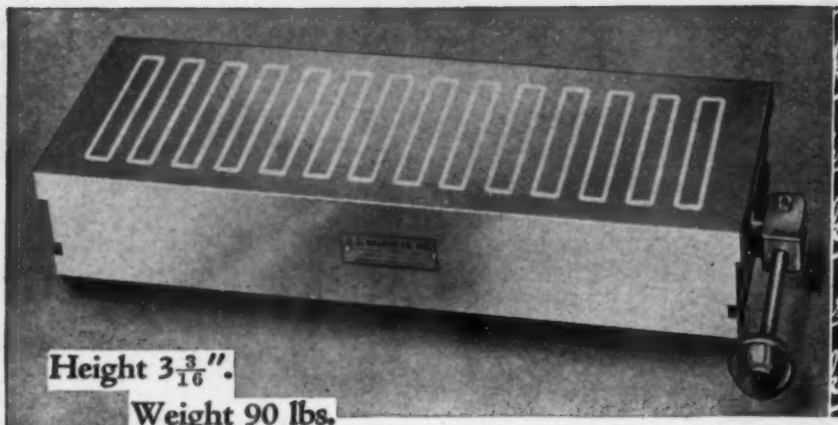

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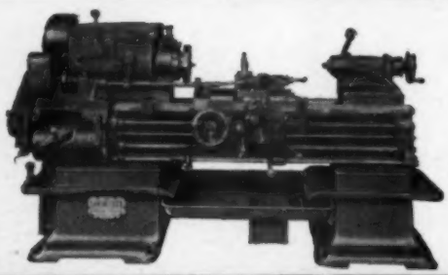

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Simple as A B C
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COMPARE THIS TO OTHER METHODS
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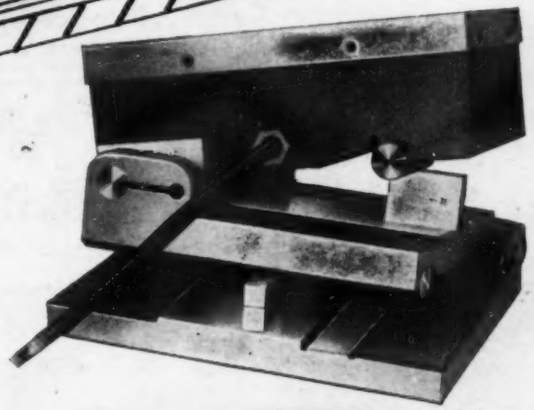

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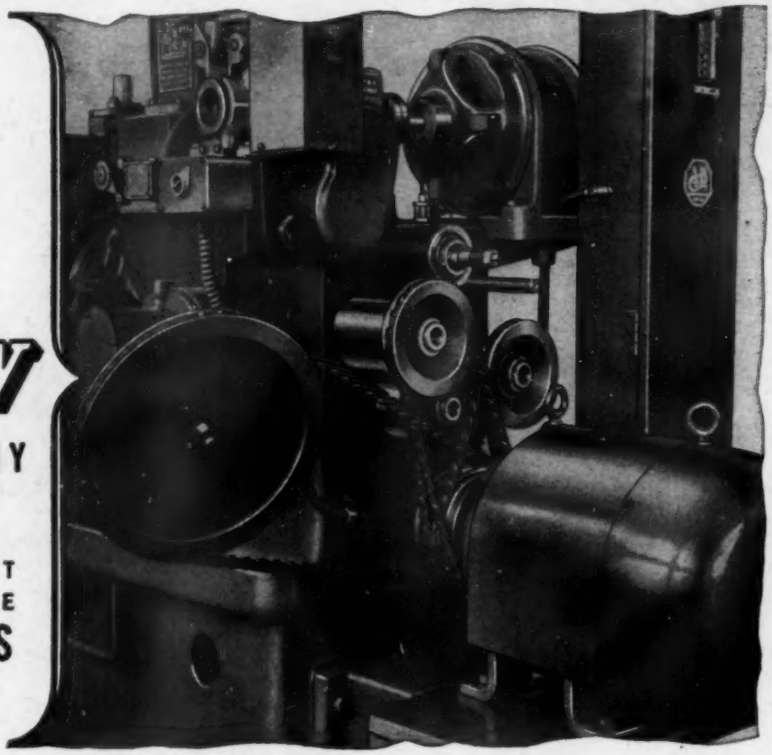

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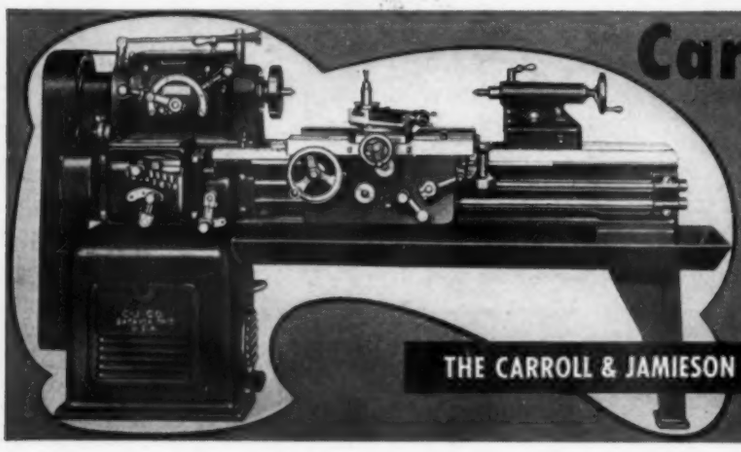

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Modern Design—

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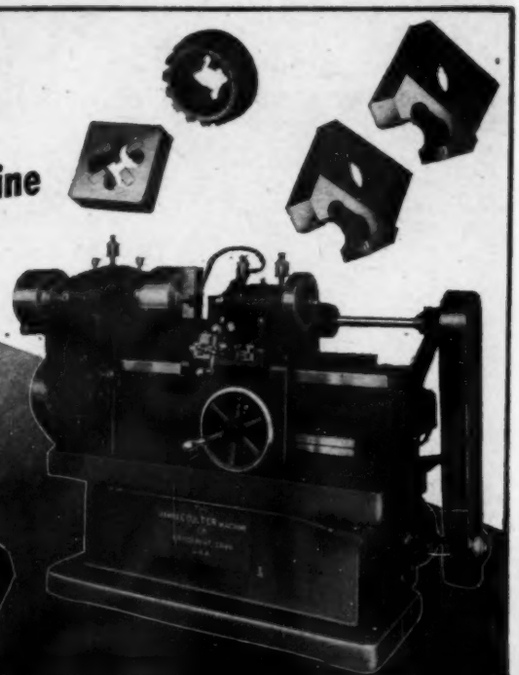

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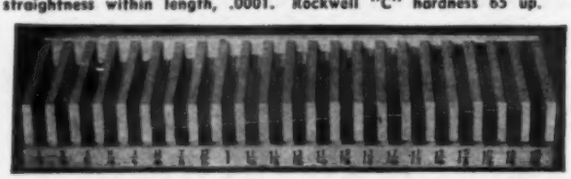

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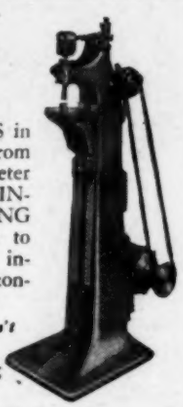

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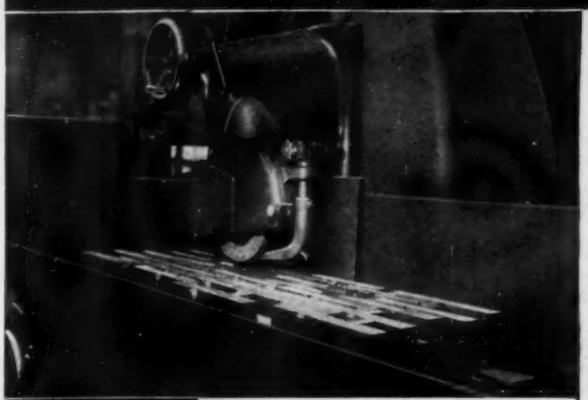
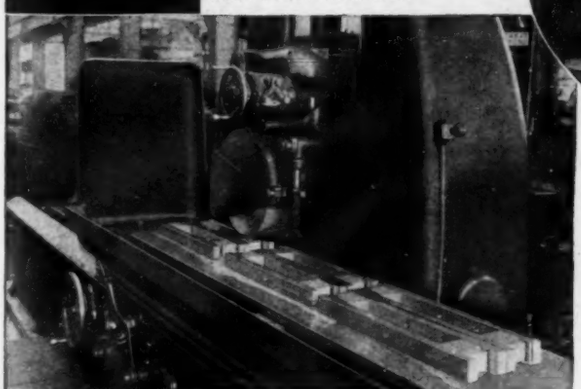


● Cross Slide Draw Bars formerly ground 5 pieces at a time. Now ground on a Mattison Grinder 27 pieces per load. 50% time saving.

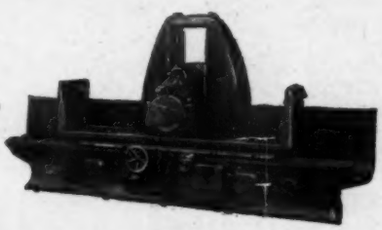
● Caps previously ground few at a time on small grinder. Now, Mattison Grinder handles 75 at a time. Time was reduced from 7 hours to 30 minutes.

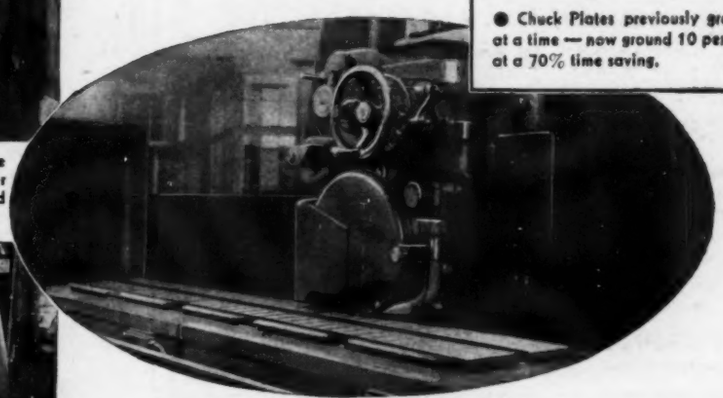


● Head Slide Guides formerly ground one at a time in 36 minutes — Now ground on a Mattison Grinder 9 pieces per set-up at a 77% time saving.

Examples: Grinding 75 pieces per load instead of 18 — cut time 80% . . . . . 10 pieces per load instead of 2 — cut time 70%, etc.

Jobs shown indicate the possibilities for increased production by handling large quantities per set-up. In your efforts to obtain maximum production and lower cost, it will pay you to check into the capabilities of the Mattison Grinder.





● Chuck Plates previously ground 1 at a time — now ground 10 per set-up at a 70% time saving.

ADDITIONAL INFORMATION

Also available is free Set-Up Book showing further examples of work ground on Mattison Grinders — Send for a copy today.

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All requirements for fast, accurate and foolproof indexing are met . . . in the

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Milling, drilling (plain and radial), grinding, planing, slotting and jig boring operations are being greatly speeded up and accuracy of indexing maintained through the use of this modern, simple, and easily operated spacing device. Only the holding capacity of the SUPER-SPACER and the power of the machine on which it is used limit cutting speeds and feeds.

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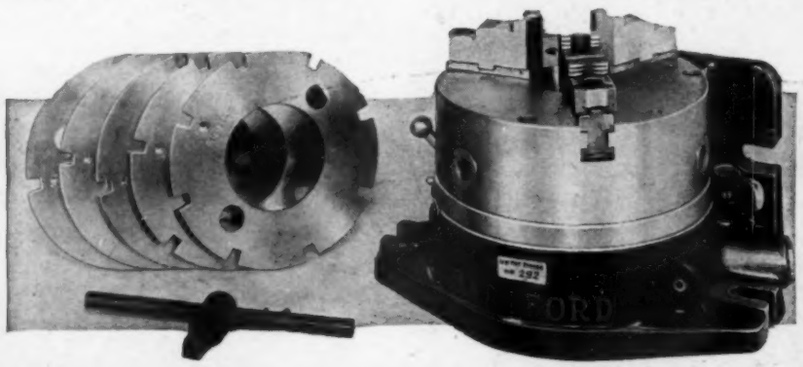
The HARTFORD SUPER-SPACER is a versatile means of speeding production on a wide range of work. Its utility is not limited to mass production only because it can be used to great advantage also on single piece work.

Write for illustrated bulletin showing a few of the wide variety of jobs that are being handled effectively and faster with the HARTFORD SUPER-SPACER.



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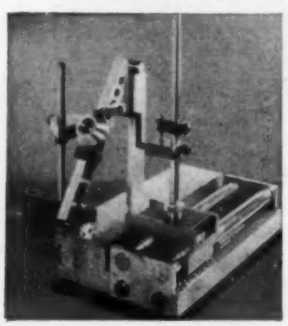

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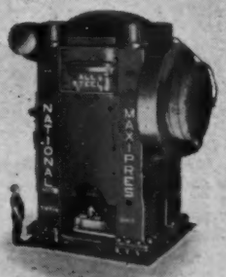

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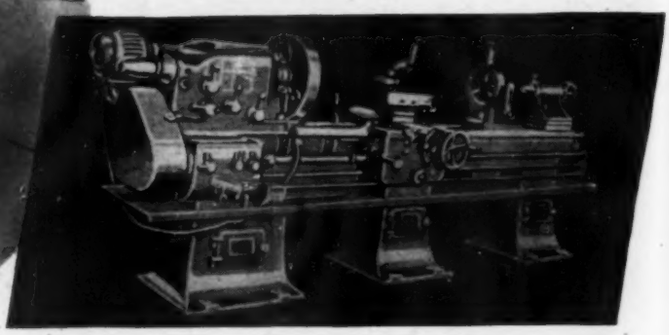

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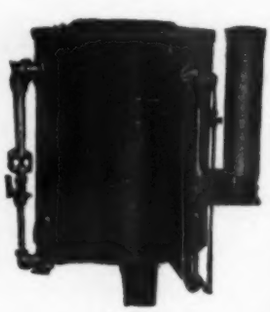
ATTAINS 1650° F. QUICKLY
Atmospheric Pot Hardening Furnace



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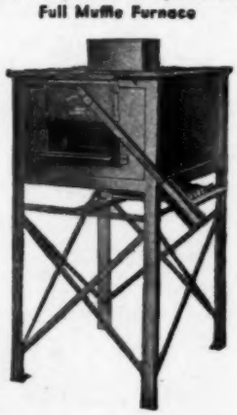
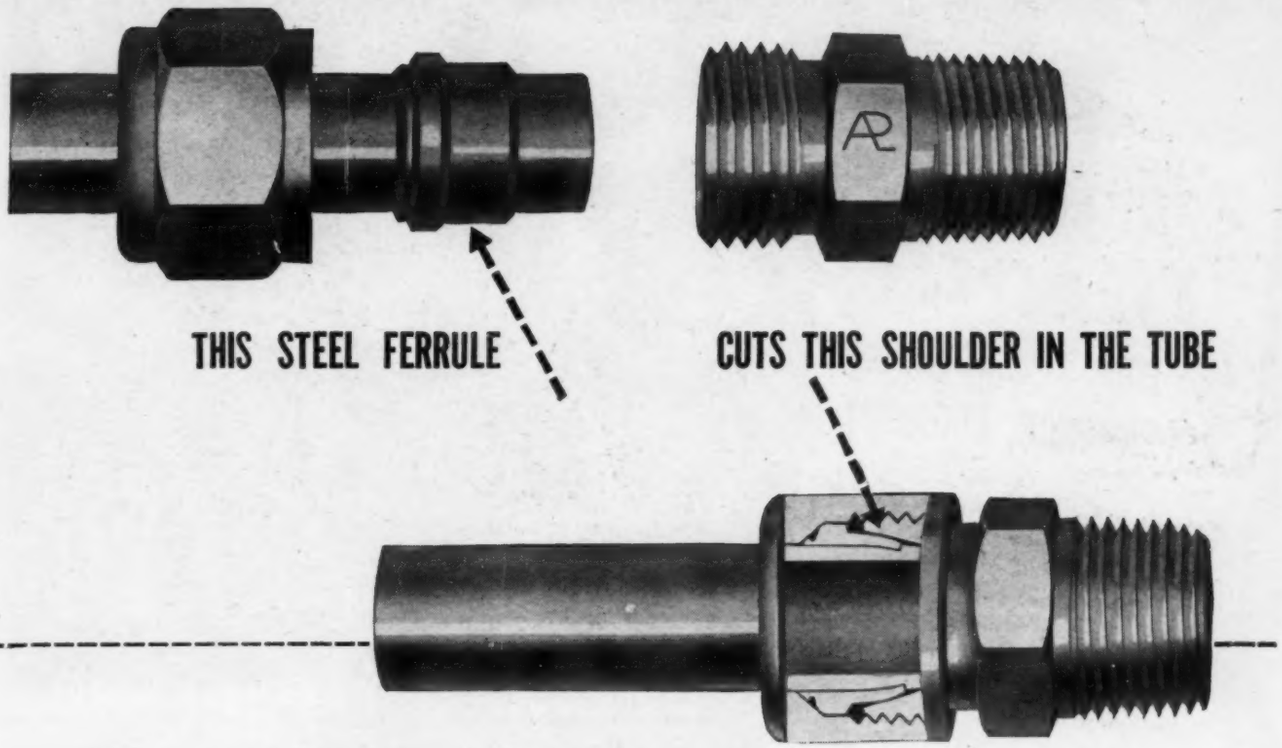
ATTAINS 2400° F. QUICKLY
Full Muffle Furnace



ON FERULOK FLARELESS FITTINGS



The shoulder provides a *permanent* leakproof seal —and the ferrule does the complete job; you won't need any special tools.

When the nut is first pulled up, this controlled cut on the outside of the tube wall is formed once and for all—regardless of draw marks or surface scratches on the tubing. The ferrule *locks* into position and *stays* there, even through repeated reassembly.

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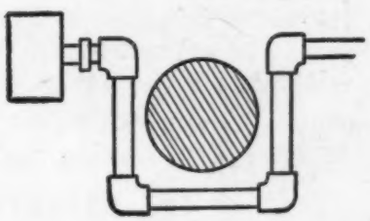
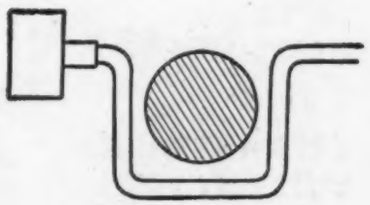
TUBE FITTINGS • VALVES

FREE FLOW— a comparison



OLD METHOD—Each connection threaded—requires numerous fittings—system not flexible or easy to install and service. Connections not smooth inside—pockets obstruct flow.



MODERN METHOD—Bendable tubing needs fewer fittings—no "threading on the job"—system light and compact—easy to install or service—no internal pockets or obstructions to free flow.

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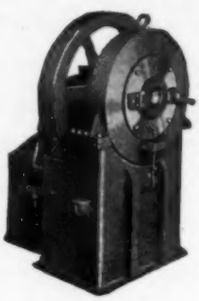

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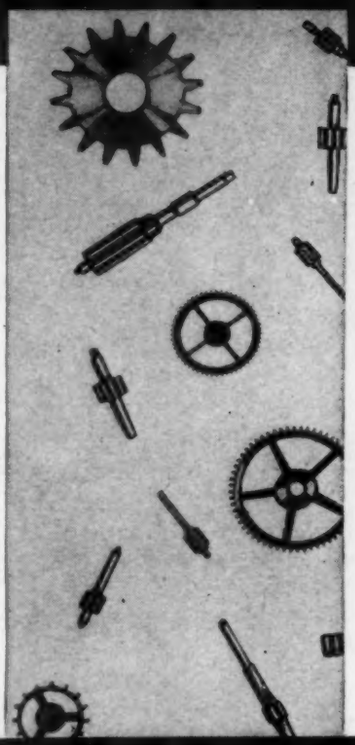

SPECIFICATIONS

PINION MACHINES

Diameter capacity, approx. ½"
Coarsest pitch about 32 D.P.
Strokes of Work slide for pinions—.24" to .45"
Strokes of work slide for stacked gears —.85 to 1"

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Pitch diameter, capacity 1½"
Strokes for work slide, .40", .65", 1.00", 1.25"

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ACCURACY BOOSTS PRODUCTION

No. 1G INTERNAL GRINDER
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Patented Cutting Off Tool Holders
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Precision CENTERED EYE Bending

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1. Release set screw in the side of spindle.
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For complete information refer to page 38, and 64 through 78 of Scully-Jones Tool Engineering Manual 500, or write for details.

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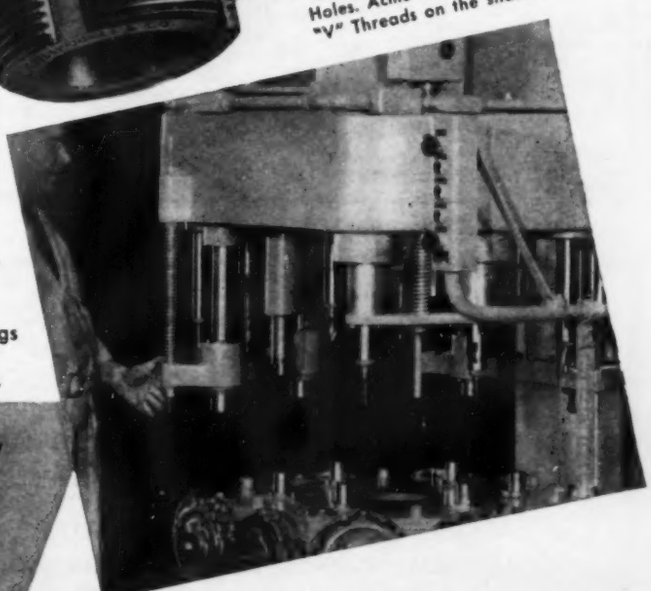

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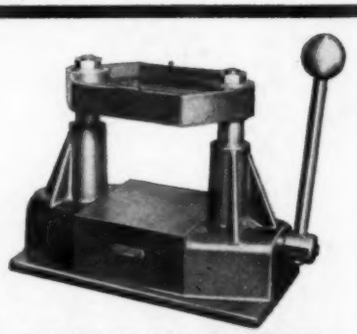

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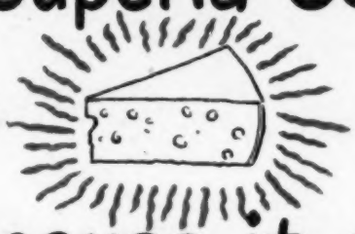
Superla Soluble Oil develops no  strong odor. That's because it contains a blend of ingredients selected to prevent it from becoming rancid.

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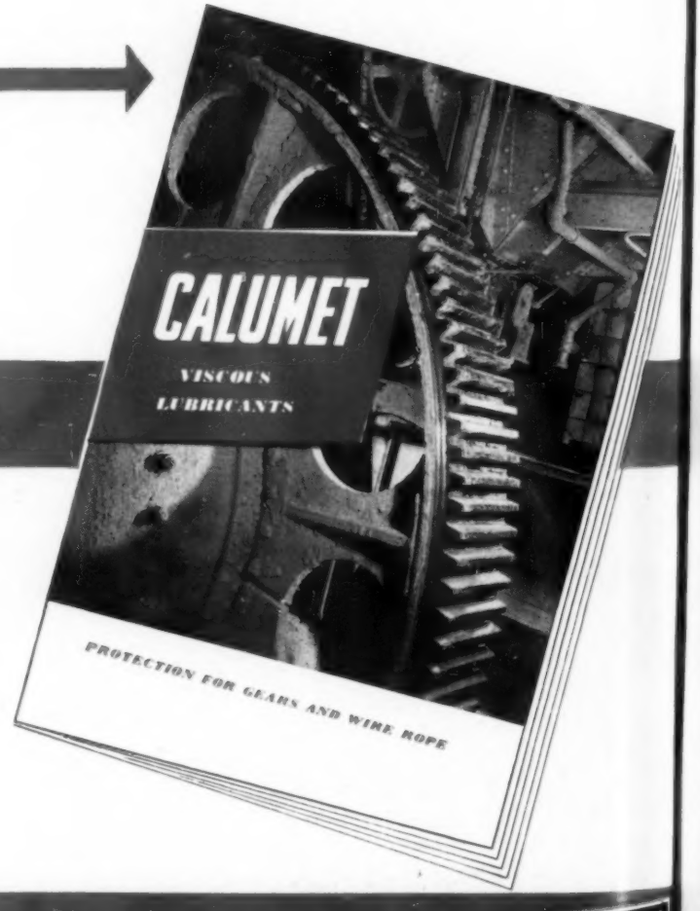

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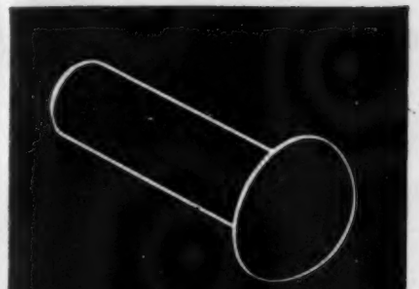

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American Machinist

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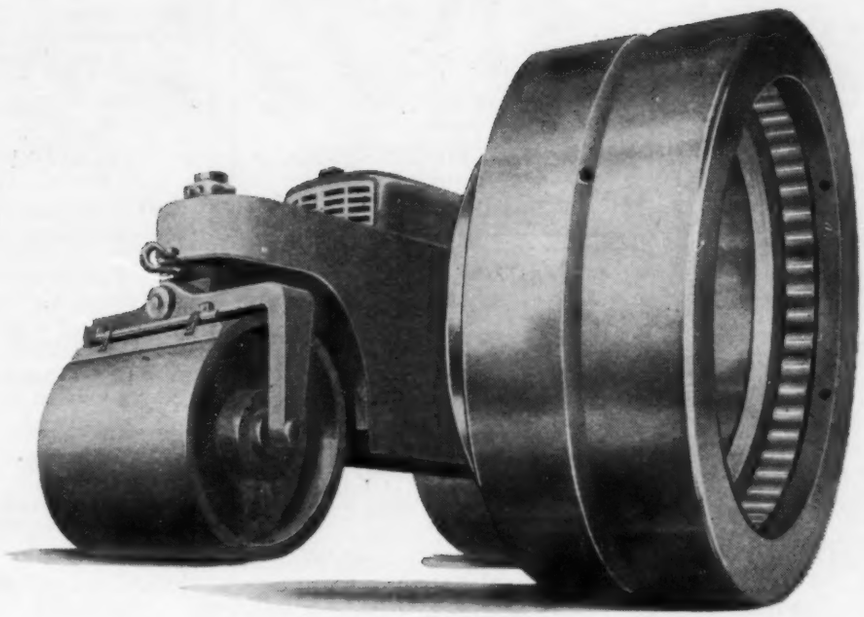


Smooth rolling . . .

is assured by the precision, anti-friction construction of Torrington Type NCS Needle Bearings. Sturdy races and the full complement of rollers provide dependable, low-wear operation

In heavy-duty applications . . .

for loads are evenly distributed over a large area of bearing contact surface. The compact size of NCS Needle Bearings also allows a reduction in size and weight of related parts with no sacrifice in strength.

Other advantages include efficient lubrication, low coefficient of friction for operating economy, and unit construction for easy assembly. To help your equipment perform smoothly with minimum maintenance attention, consider Torrington Type NCS Needle Bearings.

THE TORRINGTON COMPANY

SOUTH BEND 21, INDIANA TORRINGTON, CONN.

Offices in All Principal Cities

TORRINGTON BEARINGS

• NEEDLE • SPHERICAL ROLLER • STRAIGHT ROLLER • TAPERED ROLLER • BALL •

CONTRACT WORK

CONTRACT
Machine Parts Manufacturing

Open Time on Latest Type Equipment:

- Production Automatic Milling Machines and Drill Presses
- Turret Lathes, 2¼" Bar Capacity
- Precision Cylindrical Grinding up to 12"x 36" (Including Internal and Taper)
- Spray Painting of Metal Parts
- Steel Heat Treating Facilities

Modern, fully equipped facilities for designing and building Special and Automatic Machinery, Metal Stamping Dies, Special Tools, Jigs & Fixtures. Large assembly floor space in modern steel and brick building.

Inquiries Invited

PHILIP H. BUEHRLE & SON, INC.

Plants	*Office*
SOUTH RIVER, N. J.	SPOTSWOOD
SPOTSWOOD, N. J.	NEW JERSEY

Established 1930

CONTRACT MACHINISTS MANUFACTURERS

Let us quote on the machining of your parts or complete assemblies.

Also

Metal fabricators—All types of welding, flame cutting, on a production basis. Your prints and specifications will receive prompt attention.

KOKOMO MACHINE CO.
120 WEST MONROE STREET
KOKOMO, INDIANA

Automatics — Semi-automatic

SCREW MACHINES
AVAILABLE

Automatics up to 1¼" round bar stock. Semi-automatics ⅞". Large punch press and automatic threading machine. All facilities of well equipped machine shop. Send blue prints or samples for prompt quotations.

PARK SPRINKLER MFG. CO.
P.O. Box 6368, Zone 5
4031 Lenox Ave. Jacksonville, Fla.

OPEN FACILITIES
Aspegren Mfg. Co., Inc.

Special Machines built to Specifications —Experimental Work.

Complete Machine Shop, Stamping and Deep Drawing, Turret Lathe Work—Cap. ½-2" bar feed.

Fabrication & Welding Capacity
Grey Iron Foundry Capacity

Prompt Service — Write or Wire

1612 WEBSTER AVENUE
NEW YORK 57, N. Y.

SEND B.P. FOR
MFG. COMPLETE ASSEMBLIES
Tool—Jigs—Dies
Screw Machine and Turret Lathe Work
Stampings—Gears
POSSY'S TOOL & MFG. CO.
51 Meadowbrook Buffalo 6, N. Y.

SCREW MACHINE and TURRET LATHE PRODUCTS
Planer and Hor. Boring Mill Work. Castings Available. Gears, Sprockets, Jigs and Fixtures. Quick Delivery. Send B. P. For Quotations.
LEMBO MACHINE WORKS
154-158 East 23rd St., Paterson 4, N. J.

OPEN TIME

- W & S 2¼" 5 Spindle Automatic Lathe
- 110, 55 & 35 Ton Punch Presses
- Cleveland 1-1/16" Model A Automatic Lathe

Send prints or Samples for Prompt Quotations

ORSCHELN BRAKE LEVER MANUFACTURING CO.
Moberly, Missouri

FLAME CUTTING
WELDED STEEL FABRICATION

Machine frames and bases, gears, flywheels, pulleys, special shapes.

FOUNDRY — MACHINE SHOP
With facilities for normalizing and sandblasting.

SPECIAL ATTENTION TO RUSH OR REPAIR JOBS

Send prints for quotation

J. B. LUND'S SONS
CHEBOYGAN MICHIGAN

PATTERNS in WOOD and METAL
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us — we will take care of them.
GENERAL PATTERN WORKS
2233 Buck Street Cincinnati, Ohio

PRECISION MACHINE WORK
Mold plates, Cavity plates, Rubber molds, Hydraulic pump units and parts to specifications. Die plates for injection molding. Strain rods. Production work, turret lathe, exceptional Engine lathe operations. Milling & Drilling. Machines built to specifications. Prints will receive prompt quotations.
MADISON MACHINE COMPANY
119 E. 22nd ST., PATERSON, N. J. LA 5-0630

SCREW MACHINE PRODUCTS
Multi Spindle ¼" to 2⅛" Diameter. Punch Presses to 50 Ton. Turret and Engine Lathes. All secondary operations. Drill Press, Riveting, & Soldering, Packaging & Assembling.
Send us your prints or samples for quotations.
METOMIC CORP.
2944 W. 26th St., Chicago 23, Ill., Bishop 2133

LARGE CHUCKING MACHINES
(16" 8 spdl. Bullards, (5))
Fully tooled, ready to go! Latest design, with sufficient space for mfg. & assembling of allied parts in Detroit. Interested in renting or leasing to reputable concern, or, running on 50-50 investment basis.
CW-1375, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT : BUSINESS : **"OPPORTUNITIES"** : EQUIPMENT : USED OR RESALE

UNDISPLAYED —RATES— DISPLAYED

60c per line, minimum 4 lines. To figure advance payment count 6 average words as a line.

Positions Wanted (full or part time individual salaried employment only) ½ the above rates payavble in advance.

Box Numbers—Care of publication New York, Chicago or San Francisco offices count as 10 words.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Individual Spaces with border rules for prominent display and advertisements.

The advertising rate is $8.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞" vertically on a column—3 columns—30 inches to a page.

POSITIONS VACANT

WANTED: CHIEF tool and die engineer. Manufacturer of bus bodies and custom auto bodies. Employing approximately 1100 people requires the services of a qualified tool and die engineer to take complete charge of tool and die engineering and construction of same. Must be experienced in passenger car or bus body tooling, also experience helpful in tooling for plane manufacture. This is a permanent position with a reliable old company. Future for man with proper experience and who can accept responsibility supervise personnel, and carry complete tooling program. State past ten years of employment giving names of such employers and salary desired. All communications will be held confidential. Address, P-1363, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

WANTED
REPRESENTATIVES AND DEALERS
To handle nationally advertised new holding tool. No competition. Attractive prices and discounts. Good commissions. Immediate delivery. Territories open. Write for particulars.
RW-1377, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

POSITIONS VACANT

WANTED: CHIEF Tool and Die Designer. Mfg. of outdoor chair and metal furniture, requires the service of a qualified tool and die engineer, must be familiar with all type of drawing, piercing and blanking die, capable of designing jig and fixture, and able to develop new equipment. This is a permanent position with an old established company. Give past experience and salary expected. Southern Wire & Iron Works, 441 Memorial Dr., S.E., Atlanta, Ga.

(Continued on page 314)

ADDITIONAL EMPLOYMENT ADS ON PAGE 314

EVERY ITEM GUARANTEED AS REPRESENTED

FALK FOR DEPENDABILITY IN REBUILT MACHINERY

AUTOMATICS

2—#00 Brown & Sharpe Full Automatic, Standard Speed

1—1¼" Cone 4-spindle Automatic, Motor Driven, Threading Spindle

1—#515 National Acme 9/16" 4-spindle Automatics, complete

LATHES

10"x24" Logan Q.C.G. Lathes (new)
14"x6' Hendey Yoke Head
14"x6' Rockford Cone drive (two)
16"x6' Lodge & Shipley Geared Head, M.D.
16"x8' Monarch Geared Head Lathe
18"x10' American, Geared Head, Taper
18"x6' American Q.C.G. motor drive
20"x10" American Q.C.G. motor drive
20"x11' Schumacher-Boye, M.D.
24"x10' LeBlond Quick Change Gear
26"x18' Bridgeford geared head
28"x10' Davis cone driven
32"x16' Bridgeford geared head
20"x8' Lodge & Shipley, motor drive
24"x22' Lodge & Shipley, G.H.M. drive
24"x36' New Haven, M.D.

TURRET LATHES

4—#4 Warner & Swasey Hand Screw Machines, arr. Motor Drive
2—#4 Warner & Swasey Universal Turret Lathe, Motor Driven
16" Warner & Swasey Brass Lathe
#2A Warner & Swasey Universal
#3A Warner & Swasey Universal, motor drive
#4 Foster Universal Turret Lathe
3—Morey #2G Geared Head Turret Lathe, motor drive (late model)
2—Simmons #2 (microspeed) Turret Screw Machine (late model)
Bullard 42" Vertical Turret Lathe

MULTIPLE DRILLS

Natco #12 Arranged for 20 spindles
Natco #D6, 24 spindles, M.D. late type
Natco #D5, 14 spindles, M.D. late type
Fox #15, 54 spindles, M.D.

GRINDERS

Blanchard #16 Vertical Rotary Surface Grinder, motor driv.
Pratt & Whitney 14" x 36" Vert. Surface Grinder, motor drive
12" No. 22 Heald Rotary Surface Grinder
16" Persons-Arter Rotary Surface Grinder
1—Seybold 96" Knife Grinder
Oliver of Adrian Drill Grinders
Cincinnati Centerless Grinders #2 M.D.
#12 Greenfield Internal Hydromatic Grinder, sizematic type
#2 Brown & Sharpe Surface Grinder
#70 Heald Internal Grinder
#60 Heald Cylinder Grinder
10"x18" Norton Cylindrical
2—Cincinnati, #1½ Tool & Cutter Grinders

FOUNDRY MACHINES

2—#0 Johnson & Jennings, Jolt Squeezer Draw Pattern, 15"x21" Table
2—#342 Osborn Jolt Rollover Pattern Draw Moulding Machines, 23x38" Table
2—SPO Hand Rollover Power Draw Moulding Machines complete with run-out cars 22½"x60"
1—#602 Osborn Jolt Rollover and Pattern Draw, jolt cap. 900#, 36" flask length.
1—Tessmer, Sprue Cutter, 1¼" square, capacity

SHEARS & METAL WORKING

Lennox Splitting Shear, ¾" cap.; 8' throat
Lennox Bevel Shear, ¼" cap.
Peckstow 30"x18 ga. Squaring Shear
Niagara 48" Roller Leveller, 8 Rolls
Niagara Ring & Circle Shear

MILLING MACHINES

#3, #4, #5 Cinn. High Power, Plain, S.P.D.
P & W 2½" Duplex Spline Miller, M.D.
Hanson & Whitney 10"x24" Thread Miller
Pratt & Whitney 6"x24" Thread Miller
#3B Hendey Universal Miller, motor drive
#4 Cinn. Vertical High Power Miller. (2)
Milwaukee #2 Dble. Overarm. Motor driven.
Cincinnati #3 Dial Type Vertical. M. Drive.

BORING MILL

3½" Bar Landis-Rochester Horizontal Boring Mill, Model #3

RADIAL DRILLS

3½' Arm, 10" Column Cincinnati-Bickford
4' Arm, 11" Column Cincinnati-Bickford
5' Arm, 13" Column Cincinnati-Bickford
5' Arm, 14" Column Fosdick, motor drive
6' Arm, 15" Column Cincinnati-Bickford

SHAPERS — PLANERS

Fellows No. 6—36" Gear Shaper, motor dr.
24" American H.D., B.G. Crank Shaper. Motor drive 3/60/220/440
20x20x36 N.B.P. Shaper Planer
Whitcombe 24"x24"x6' Planer
1—New Haven, 12" Slotter (like new)
Gray 26"x26"x8' Planer
Betts 120" x 72" x 35' Metal working Double Housing Planer. Equipped with: 4 heads and power rapid traverse. With motor drive and controls, bed is 61' 3½" long

Pratt & Whitney 0" to 6" Vertical Shaper, swivel head on ram, rotary table—20" diam. Recently overhauled. Very good condition. Motor driven.

POWER PRESSES

2—#1A Standard Bench Type Press, ¾" stroke
#4 Bliss D. C. Forging Press
Bliss 68-C Double Action, three Crank Press.
Hilles & Jones #4 Single End Punch and Shear. Equipped as Plate Shear with 18" Blades. AAR, motor drive, 48" throat
Bliss #76½B Single Crank Geared Press, 7" shaft, 3" stroke
Horton-Ackerly, Back Flywheel Bench Presses, ¾" & 1" stroke
Caldwell, 200 tons capacity, Hydraulic Horizontal Wheel Press
Lucas 15 ton Power Arbor Press
Bliss-Consolidated #163B S.S. Dble. Crank Press
Baxendale #4 O.B.I. Power Press, 2½" stroke
Clearing, Crankless Press #F-1200-28, 200 tons cap. Motor drive.

BUY FROM STOCK
Telephone
MAIN 6347-6348

FALK
MACHINERY COMPANY
Machinery Merchants

18 WARD ST.
ROCHESTER 5
N. Y.

MOREY

MODERN MACHINE TOOLS
LOW PRICES

NEARLY

BORING MILLS—Vertical

BETTS 120"—2 swivel head, motor drive
BETTS (Consolidated) 100"—2 heads, DC, Latest Type
BETTS (CONSOLIDATED) 84" 3-heads, AC Latest
BULLARD 36", New Era Type, M.D.
BULLARD 16-, 6-spindle Mult-au-matic, Latest Type
COLBURN 72" 2 swivel heads, AC, M.D.
KING 36" Turret, M.D., Latest Type
NILES 62", 73", 100", 120", 2 swivel heads, PRT, AC, M.D.

DRILLS—Radial

AMERICAN 3½'9"—Maxi-Speed, Motor Drive
AMERICAN 4'11"—5'13" AC, M.D.
AMERICAN 5', Univ., AC, M.D.
AMERICAN 7' Triple-purpose, M.D.
AMERICAN 3'11" Hole Wizard, Latest Type
CARLTON 6'15", motor on arm
CARLTON 8'19" High speed, Latest Type
CINCINNATI BICKFORD 5'13", 6'15" AC, M.D.
CINCINNATI BICKFORD 6' Univ., AC, M.D.
DRESES 5'13", 4'13" AC, M.D.
MUELLER 4½'9", 4'11" AC, M.D.
WESTERN 3', 5'18", 6'20", latest type

GEAR CUTTING EQUIPMENT

BARBER COLMAN Type A Hobber—latest
BARBER COLMAN Type S, #3, #12 Hobber, M.D.
BROWN & SHARPE #3H gear cutter, M.D.
CROSS #73 Univ., tooth-rounder, Latest Type
FELLOWS #7, 7A, 72, 75A, 77, 615A, 645A3 Gear Shaper, high speed, Latest Type
GLEASON 11", 18" bevel gear generator, M.D.
GLEASON #13 tester, M.D.
GOULD & EBERHARDT 36H, 96H Hobber, M.D.
GOULD & EBERHARDT 12 H.S., Latest Type
PRATT & WHITNEY 10" Grinder, hyd.—latest type
SCHUHARDT & SCHUTTE #1, #2, Hobber, differential, infeed, M.D.

GRINDERS—Cyl.—Plain & Uni.

BROWN & SHARPE #1, #3, #4 Univ., Latest
BROWN & SHARPE #5 Plain 3x12, LATEST
BROWN & SHARPE #20—plain—10x18—Latest Type
LANDIS 6"x18" Type C Hyd., Latest Type
LANDIS 30x220" Centers, Plain, M.D.
NORTON 14x36 Type "C", Universal, Hyd., Latest
NORTON 16x72 Plain Type C—latest type
NORTON 16x72 Type C, Universal, Hyd., Latest

GRINDERS—Internal Cutters & Miscellaneous

BROWN & SHARPE #13, Universal Tool, Latest Type
BRYANT No. 16—16" Chucking—Internal—latest
BRYANT #5, Internal, hyd., latest type
CINCINNATI #2, #4 Centerless, Latest Type
HEALD 72A3 Sizematic Internal, latest type
HEALD 72A5 plain internal, latest type
HEALD #81, Sizematic, Gagematic, Latest Type
HEALD 75A Plain, Internal, Latest Type

GRINDERS—Surface

ARTER 30" Rotary Surface—Hydraulic—latest type
BLANCHARD #16A—Dial Type—motor drive
BLANCHARD #27, 18, M.D., Latest Type
DoALL #G-10, 8x24, Hyd., Latest Type
GALLMEYER & LIVINGSTON #35, 8x24, Hyd., Latest Type
GALLMEYER & LIVINGSTON #55, 12x36, Hyd., Latest Type
HEALD #22, 12" Rotary, Latest Type
MATTISON 12x16x48 Hyd., Latest Type
MATTISON 14x16x60 Hyd., Latest Type
NORTON 10x36 Hyd., Latest Type
THOMPSON 16x30x48 Hyd., Latest Type
THOMPSON 8x12x24 Type B, Hyd., Latest Type

JIG BORER

PRATT & WHITNEY 3B, M.D., Latest Type
PRATT & WHITNEY 2A, M.D., Latest Type

LATHES—Engine & Mfg.

BETTS BRIDGEFORD 84x24' bed, AC, M.D.
BRIDGEFORD 36"x28', 36"x32' bed—2 carriages, M.D.
HENDEY 12x54" Centers, Engine, Latest Type
HENDEY 14x8' bed, Engine, Geared Head
KEIGHLEY LIFTS 8x16x4', Gap, AC, M.D.
LODGE & SHIPLEY 16/20"x30" centers, Timken
LeBLOND 13x4', 17x5', 17x14' bed, Timken Bearing, Rapid Production, Latest Type
LeBLOND #2 Deep Hole Borer, Timken, Latest
LOSWING 4x60, 4x84, 8x60, 8x84, 8x108, 5x34 Timken
MOREY MATTHEWS, Shaft Turning, Latest Type
NILES 36x24' Centers, Time-Saver, Timken, PRT
NILES 42 x60", double head Motor Drive
NILES 48x23', 32', 34', 35', Centers, heavy duty, Timken Bearing, PRT, Latest Type
NILES 60x10' 35', 40', Centers, heavy duty, Timken Bearing, Latest Type
NILES BEMENT POND 72"x62' Centers, combination Boring and Turning, heavy duty, Motor Drive
NILES 30x50' Deep Hole Borer, Timken, Latest
PITTSBURGH 50'x30' bed—M.D.
PRATT & WHITNEY #1½B 50", 2 spindle, Latest
REED PRENTICE 24x20' bed, AC, M.D.
WARD HAGGAS & SMITH 18x30x10' ed, Gap AC M.D.

BETTS (CONSOLIDATED) 100" Vertical Boring and Turning Mill, 2 swivel heads on cross rail, Timken Bearing table, with 40 HP main drive motor and electrical starting equipment, latest type.

AUTO. SCREW MACHINES

ACME GRIDLEY Model RA-6, 2", Latest Type
BROWN & SHARPE #4 Highspeed, 1⅛" cap., Latest
CONOMATICS 3½" 4 spindle—latest type
CONOMATICS 2⅝"—6 spindle, Latest Type
NATIONAL ACME 9/16"—5 spindle—Model C—M.D.

BORING MILLS—Horizontal

DEFIANCE #25A, 3¾" ar, M.D., Latest Type
DETRICK & HARVEY 4", 5" bar, floor type, M.D.
GIDDINGS & LEWIS 25RT—2½" bar—LATEST TYPE
LANDIS #35—3½" bar—floor type
NILES BEMENT POND 5", 6", 7" bar—floor type
NILES BEMENT POND 4½" bar, M.D.
OHIO 5T-600—5" bar—LATEST TYPE
P & H #10 3½" bar, floor type, M.D.
UNIVERSAL #3A—3" bar, Motor Drive

DEPENDABLE MACHINE TOOLS • PROMPT SERVICE

ALL BUILT SINCE 1941

LATHES—Turret

BARDONS & OLIVER #5, #7 Timken, Latest
CINCINNATI ACME #1, #5W, Timken bearing, latest
GISHOLT #3D, 8D, Simplimatic, Timken, Latest
GISHOLT #3, #4, #5 Univ., Timken Bearing, Latest
GISHOLT #1L, #2L, Universal, Timken, Latest
GISHOLT #4L, 9" hole—cross sliding turret—Timken
JONES & LAMSON #3, 7C 8A, Uni. Timken
LIBBY #1H-5 Timken Bearing—latest 5½" hole
MOREY 2G, #3, #4, Timken Bearing, latest
WARNER & SWASEY 3, 4, 5, Uni., Timken
WARNER & SWASEY #3A, 4A, Universal 6" cap., bar and chucking, Timken Bearing, Latest Type
WARNER & SWASEY #1A, Univ., Timken, Latest

MILLING MACHINES—Mfg.

CINCINNATI 48", 24" duplex, automatic, SPD
CINCINNATI 3-24 Duplex Hydro., Timken, Latest
INGERSOLL 48x24x16', 4 heads, Planer Type, M.D.
INGERSOLL 32x24x16', 2 heads, Planer Type, M.D.
MOREY #12M 2 spdle. Profiler & Milling Machine
TAYLOR & FENN M-80, Duplex Spline, Latest Type

MILLING MACHINES—Plain

BROWN & SHARPE #000 Timken Bearing, Latest
BROWN & SHARPE #12 auto., Timken, Latest
CINCINNATI #2, 3, Dial Type, Timken Latest
CINCINNATI #4, 4S, 5 Timken Bearing, Motor Drive
CINCINNATI 0-8 Plain, auto, Timken
CINCINNATI 4-36 Hydromatic, Latest Type
CINCINNATI 2-24—Timken—LATEST
KEARNEY & TRECKER #3K, 4K, Timken, Latest
KEARNEY & TRECKER 2K, 3K, Timken—latest
KEMPSMITH #4 Maximiller—Timken—latest
OHIO 16x72" table, Timken Bearing, Latest

MILLING MACHINES—Vertical

CINCINNATI 2, 3, 4 Dial Type—Timken—LATEST TYPE
CINCINNATI 0-8—Timken—LATEST
KEARNEY & TRECKER 2K, 3K, Timken—latest
REED PRENTICE 3VG high speed with or without Detroit Hyd., Duplicator, Latest Type

PLANERS

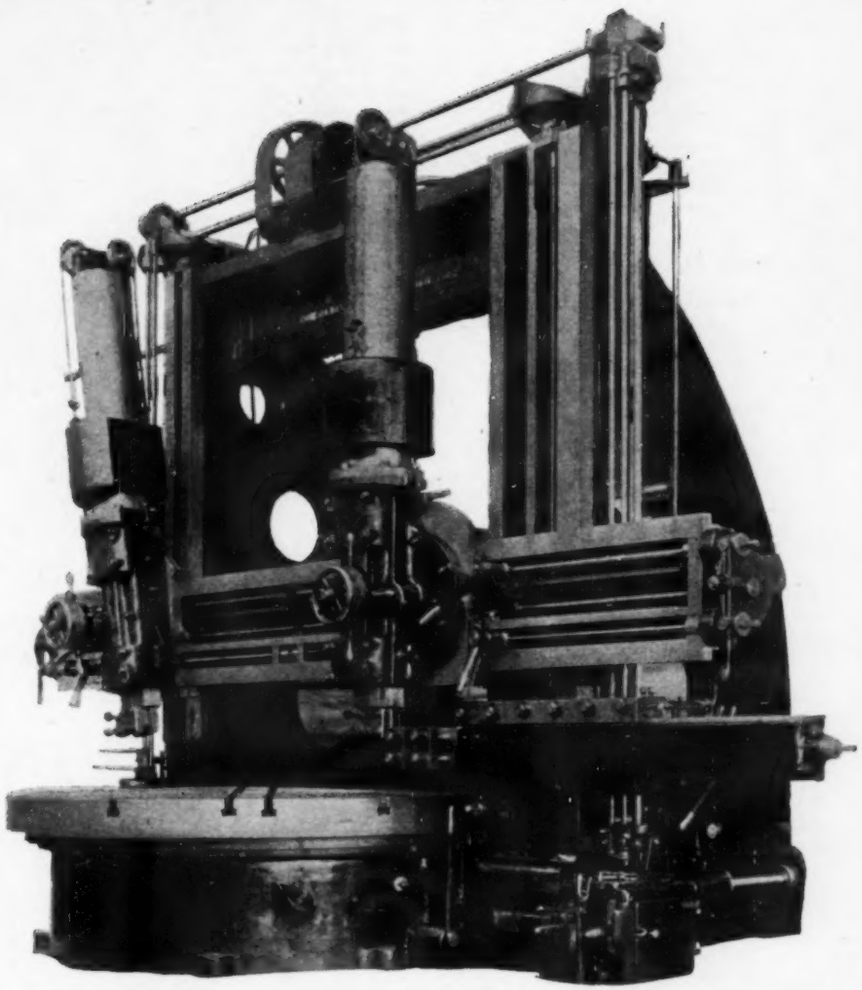
DETRICK & HARVEY 48x48x16', 4 heads, Hyd.
DETRICK & HARVEY 84x84x18', 4 heads, Box Table.
GRAY 36x36x16', 3 heads, DC, M.D.
MORTON 60"—Combination planing, shaping, boring, drilling, milling—M.D.
NILES 48x48x16', 2 heads, AC, M.D.
OHIO 42x42x20'—2 heads, AC

SHAPERS

CINCINNATI 20", M.D., Latest Type
GOULD & EBERHARDT 24" High duty, M.D.
LAMAIRE 18" Vertical, Hydraulic, Abbreviated—LATEST
MORTON 48" Draw-Cut, M.D.
MOREY 8", 10", 12", 14", Vertical Latest type
ROCKFORD 24x24x66" Hyd., Latest Type
SMITH & MILLS 25", Heavy duty, Latest Type

THREAD MILLING MACHINES

MOREY SHIELDS 12x120, 12x192—latest type
PRATT & WHITNEY 6x20, Model C, Latest



BETTS (CONSOLIDATED) 84" Vertical Boring and Turning Mill, 2 swivel heads on cross rail, 1 side head, with drum scoring attachment, with motor and electrical starting equipment.

Over 2,000 Machine Tools in Stock. Your Inquiries Are Invited

IN STOCK—IMMEDIATE DELIVERY

LATHES

12"x21" Fay Automatic (1942)
12"x18" Lipe Carbo, Motor Drive
18"x6' American Grd. Hd.
20"x10' Lodge & Shipley
22"x48" Centers Monarch (1942)
36"x30' Lodge & Shipley Triple Geared Selective Head, two carriages
42"x18' Putnam Geared Head
50"x17'cc LeBlond Geared Head

MILLING MACHINES

No. 2K Milwaukee Plain (1941)
No. 4 Cincinnati High Power Plain
No. 2H Milwaukee Vert. (1942)
No. 2 Cincinnati Vert. (1942)
No. 2M Cincinnati Vert. (1941)
No. 3 Standard Milwaukee Vert.
No. 3 Cincinnati Vert. Dial Type
No. 3 Cincinnati Vert. High Power
No. 3K Milwaukee Vertical
24" Cincinnati Production
No. 46-90 Cincinnati Plain Hydromatic
No. 27-MB Smalley-General Thread
No. 2 Hanson-Whitney Thread
4" Taylor & Fenn Spline, M.D.
24"x24"x12' Ingersoll Adj. Rail
26"x25"x12' Ingersoll Adjustable Rail
54"x36"x10' Ingersoll Adjustable Rail
60"x48"x12' Ingersoll Adjustable Rail

DRILLS

No. 121 Baker, Motor Drive
28" Cinn.-Bickford
No. D-8 Colburn No. 6 M. T.
No. 2 LMS—26"—1 Spdl. L-G (1944)
No. 2 LMS—20"—2 Spdl. L-G (1944)
No. 2 LMS—26"—2 Spdl. L-G (1945)
No. 2 LMS—20"—3 Spdl. L-G (1943)
No. 2 LMS—14"—4 Spdl. L-G
No. 4 BM—24"—4 Spdl. Fosdick
No. 2 LMS—26"—4 Spdl. L-G
No. 2LMS—26"—6 Spdl. L-G
No. 2—8 Spdl. Leland-Gifford
6'-15" Col. Cinn.-Bickford
7'-15" Col. American Full Universal
7'-15" Col. Carlton, Motor on Arm

VERT. BOR. MILLS

34" King
42" Bullard New Era
72" Cincinnati
72" Niles Extra Heavy

HOR. BOR. MILLS

No. 25C, 3¾" Bar Defiance, Table Type (1942)
No. 360-F Giddings & Lewis (1942)
No. 560-F Giddings & Lewis (1942)

GEAR MACHINES

No. 7 Fellows Gear Shaper
11" Gleason Bevel Gear Cutter

PLANERS

36"x36"x12' Cincinnati, 4 Heads
42"x36"x12' Cincinnati, 3 Heads

MISCELLANEOUS

2500 Ton Lake Erie Hydraulic Press
No. 4 Mitts & Merrill Keyseater (1942)

TURRET LATHES

No. 2 B. & S. Screw Machine, Wire Feed
No. 3 Jones & Lamson (1942)
No. 3 Warner & Swasey, bar feed (1940)
No. 5 Warner & Swasey bar feed (1941)
2-A Warner & Swasey (1943)
No. 3-A Warner & Swasey, 6" capacity bar feed
18" Libby, 3½" H.S.
No. 3L Gisholt, Cross Turret, bar feed

GRINDERS

No. 5 B. & S. Plain (3" x 18")
4"x18" Landis Plain
10"x72" Colonial Broach Grd.
10"x24" Landis Universal
12"x36" Landis Univ. Type LCH (1945)
12"x48" Cincinnati Univ.
16"x72" Norton Type C Plain
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No. 5 Abrasive Surface Grdr.
No. 34 Abrasive Surface Grdr.
Norton Motor Driven Grinders, sizes 6x18 to 24x240

Approved WAA Dealer CHI-9

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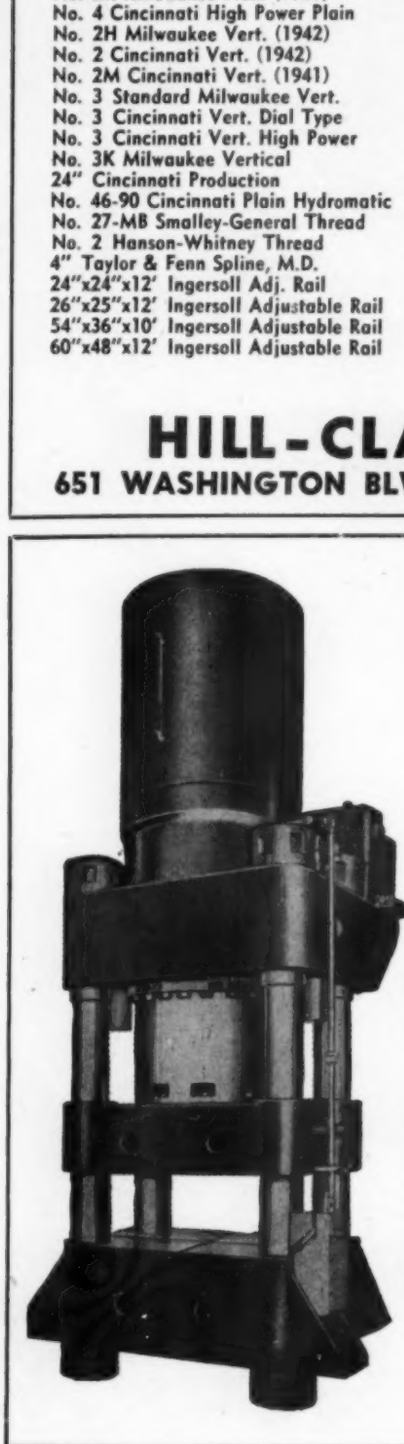

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Self Contained

Platen size 48"x42". Stroke 22". Opening 37. Ram Diameter 35". Driven by 50 H.P. Motor, *Also*

600 TON ELMES PRESS

Self contained 48x45" between rods, 36" stroke, 66" openings, 75 H.P. motor, 3 phase, 60 cycle, 220v.

1320 TON PRESS, SELF CONTAINED

600 Ton Self Contained Lake Erie Double Action Press with 175 Ton Cushion Cylinder. Distance between rods 48"x60", Stroke 30", opening 48".

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#6 Bliss, 90-125 ton rated cap. 25x30 bed, avail. in 4½" and 5½" stroke, with all accessories, latest design, 30, 88, 110 strokes per min.

35 and 40 ton rated cap. Toledo Horning Presses, 2", 4½" stroke.

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1—#87 Bliss Press, 175 ton rated cap. 32" stroke, late model.

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No. 42 Ohio Universal Mill
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No. 4D Potter & Johnston, m.d., air chuck, latest
No. 5D Potter & Johnston, m.d., air chuck, latest
4 spindle 2" Cleveland Model M, m.d., bar
2¼" Cleveland Model A, m.d., bar
2¼" Gridley, m.d., bar
4 spindle 2¼" Cleveland Model K, m.d., bar
2¼" Cleveland Model A, m.d., bar
4¼" Cleveland Model A, m.d., bar
4½" Cleveland Model A, m.d., bar
5½" Cleveland Model A, m.d., bar
7¾" Cleveland Model A, m.d., bar
No. 6A, 6C Potter & Johnston, m.d., chucking
14" Fay, m.d., chucking
20x25" Jones & Lamson, m.d.

HORIZONTAL BORING MILLS

2½" Cleveland, m.d.
2½" No. 21 Lucas, m.d.
3" No. 31 Lucas, m.d.
3½" No. 32 Lucas, m.d.
4½" No. 33 Lucas, m.d.
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4" Landis Floor Type, m.d.
4", 4½", 5½" Niles Table Type, m.d.
60" stroke Morton Boring & Milling Machine and Draw-Cut Traveling Head Planer, m.d.
10" bar Sellers Floor Type, m.d.

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24" Bullard New Era, m.d., side head
24" Bullard Spiral Drive, m.d., side head
36" Bullard New Era, m.d., side head
36" Bullard Spiral Drive, m.d., side head
36" Bullard High Speed Spiral Drive, m.d., side head, latest
42" Bullard High Speed Spiral Drive, m.d., side head, latest
42" Colburn H.D., 2 swivel heads, m.d.
48" Cincinnati Rapid Production, m.d., 1 turret, 1 swivel head
48" Colburn, m.d., 1 turret, 1 swivel head
48" Putnam H.D., 2 swivel heads, m.d.
53" Niles, m.d., 2 swivel heads
54" Colburn, m.d., 2 heads
72" Cincinnati, m.d., 2 heads
84" Niles H.D., m.d., 2 heads
100" Niles, m.d., 2 heads

RADIAL DRILLS

3' American Hole Wizard, 9" col., m.d., latest
3' American Sensitive, belt
3' Fosdick, gear box
4'-11" American Triple Purpose, m.d.
4'-13" Cincinnati-Bickford, gear box
4' Niles-Bement-Pond Semi-Universal
4'-9" Cincinnati-Bickford, m.d., latest, 3 way base
5'-13" American Triple Geared, gear box
5' Cincinnati-Bickford Plate Hole Driller, m.d.
5' Prentice, m.d.
6'-15" American Triple Purpose, m.d. on base
6'-17" American Hole Wizard, m.d. on arm, latest
6'-15" Carlton, gear box
6'-15" Cincinnati-Bickford, m.d. on base
6'-15" Niles-Bement-Pond Semi-Universal, m.d.
6'-16" Western, m.d.
8'-16" American Triple Purpose, m.d.
10'-22" American Triple Purpose, m.d. in arm

UPRIGHT DRILLS

21" Cincinnati-Bickford, m.d.
21" Fosdick, m.d.
24" Cincinnati-Bickford, m.d.
28" Cincinnati-Bickford, gear box
30" Rich H.D.
32" Aurora, belt
H3 Barnes Hydram, m.d.
D4 Colburn H.D., m.d.
D8 Colburn H.D., m.d.
No. 25 Foote-Burt, s.p.d.
No. 36HO Baker H.D., m.d., latest
No. 242 Barnes All Geared Self-Oiling, m.d., latest
No. 262 Barnes All Geared Self-Oiling, m.d., latest

MULTIPLE SPINDLE DRILLS

4 spindle Cincinnati-Bickford, separate motor on each spindle
No. 3 Baush, 16x30" head, 15 spindles
No. 3 Baush, 20x40" head, 15 spindles
C13 Natco, 12x18" head, 10 spindles
D13H Natco, 18x12" head, 10 spindles, hydraulic
2 spindle No. 262 Barnes All Geared, m.d., latest
3 spindle 12" Rockford Gang, m.d.
4 spindle No. 4 Foote-Burt, m.d.
No. 16 Fixed Center Foote-Burt, m.d.

BALL BEARING DRILLS

No. ½, 1, 2 Avey, belted m.d.
No. 1B Edlund, m.d. on spindle, new
No. 2 Leland & Gifford Hydraulic, m.d., latest
No. 2½ Allen, m.d. on spindle
No. 3 Motor Avey, m.d., type B, latest
No. 5M—16" Fosdick, m.d.
2 spindle No. 2 MA6 Avey, type B, latest
2, 3, 4 spindle Avey, belted m.d.
2 spindle 20" Canedy-Otto, m.d.
4 spindle No. 2 MA6 Avey, with 2 tapping spindles, latest
4 spindle No. 2 MA6 Avey, p.f. on all spindles, latest
4 spindle Delta, m.d., latest
4 spindle No. 2 LMS Leland & Gifford, direct m.d., latest
6 spindle No. 3 type B MA6 Avey, latest

HORIZONTAL DRILLS

No. 1B—50" Pratt & Whitney, m.d., latest
No. 1 Pratt & Whitney, belted m.d.
No. 1½ Pratt & Whitney, belted m.d.
No. 1½x105" Pratt & Whitney m.d., latest
No. 420—2 spindle W. F. & John Barnes, 10' drilling length, latest
5 spindle Detroit Semi-Automatic, belt
No. ½Bx50" Pratt & Whitney Chambering Machine, latest

GEAR GRINDING MACHINES

9" Pratt & Whitney Hydraulic Spur, m.d.
10" Pratt & Whitney Hydraulic Spur & Helical, m.d.
No. 2HS Lees-Bradner Spur & Helical, m.d.

GEAR CUTTERS

No. 6—60" Brown & Sharpe, m.d., spur
3" Gleason Straight Bevel, m.d.
8" Gleason Mfg. Type Straight Bevel, m.d.
11" Gleason Straight Bevel, m.d.
12" Gleason Straight Bevel, md.
No. 3—26" Brown & Sharpe Spur, m.d.
Cross Gear Tooth Rounder, m.d.
Cincinnati Gear Burnisher, m.d.
Gleason Spiral Bevel Gear Rougher, s.p.d.

GEAR SHAPERS

No. 61A, 615A, 645A3 Fellows, m.d., latest type
No. 6 Fellows, belt
No. 7, 7A Fellows, m.d.
No. 13LS Fellows Lapper, m.d.
No. 18 Fellows Gear Finishing Machine, m.d.
No. 61 Fellows, belted m.d.
No. 64-S Fellows, m.d.
No. 71A Fellows, m.d.

GEAR HOBBERS

10 Type A Barber-Colman Type A, m.d., latest type
3 No. 3 Barber-Colman Precision, m.d., latest type
2 Type T Barber-Colman, m.d., latest type
No. 12 Barber-Colman Double Overarm, m.d.
3 No. 12H Gould & Eberhardt Universal, m.d., latest
No. 34 Brown & Sharpe, m.d.
No. 36H Gould & Eberhardt, m.d.
No. 44 Brown & Sharpe, m.d.
48" Cleveland, m.d.

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No. 3 Cincinnati, m.d., latest, brand new (2)
No. 2 Cincinnati, m.d., older types
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No. 55 Heald, m.d.
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No. 73 Heald Airplane Cylinder, brand new
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No. 3 Gallmeyer & Livingston, m.d.
Cincinnati Monoset, m.d.
No. 2B Sellers Wet Drill, m.d.
No. 4T Sellers, m.d.
No. 2 Ohio, belt
Gleason Cutter, belt
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Sellers Type 05D, bench type
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12x48" Cincinnati Hydraulic m.d., latest
12x48" Norton Hydraulic, m.d., latest
14x72" Cincinnati, belt
18x48" Cincinnati Hydraulic, m.d., latest

INTERNAL GRINDERS

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No. 16—22" Bryant, m.d., latest
No. 16RS Bryant, m.d., latest
No. 6, 10, 20 Bryant, belt
No. 24—21" Bryant, m.d.
No. 49 Heald Single End Borematic, m.d.
No. 70 Heald, motorized
No. 72A Heald Plain, 3 motor drive
No. 72A3 Heald Sizematic, 3 motor drive
No. 72A3 Heald Gagematic, 3 motor drive
No. 72A5 Heald, m.d., latest
No. 72A5 Heald Sizematic, m.d.
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No. 74 Heald, m.d.
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No. 5 Thompson Hydraulic, m.d., latest
Builders Iron Foundry 8x4", m.d.
No. 10 Blanchard, m.d.
No. 11 Blanchard, m.d., latest
No. 16 Blanchard, m.d., 26"
No. 18 Blanchard, m.d., 30" chuck, latest
No. 25A—16" Heald Rotary, m.d., latest
No. 25A—24" Heald Rotary, m.d., latest
14" Pratt & Whitney Vertical, m.d.
22" Pratt & Whitney Type B, m.d.
No. 22—12" Heald Rotary
No. 33 Abrasive, m.d.
No. 260—16" Heald Rotary
30"x18"x6' Springfield Planer Type
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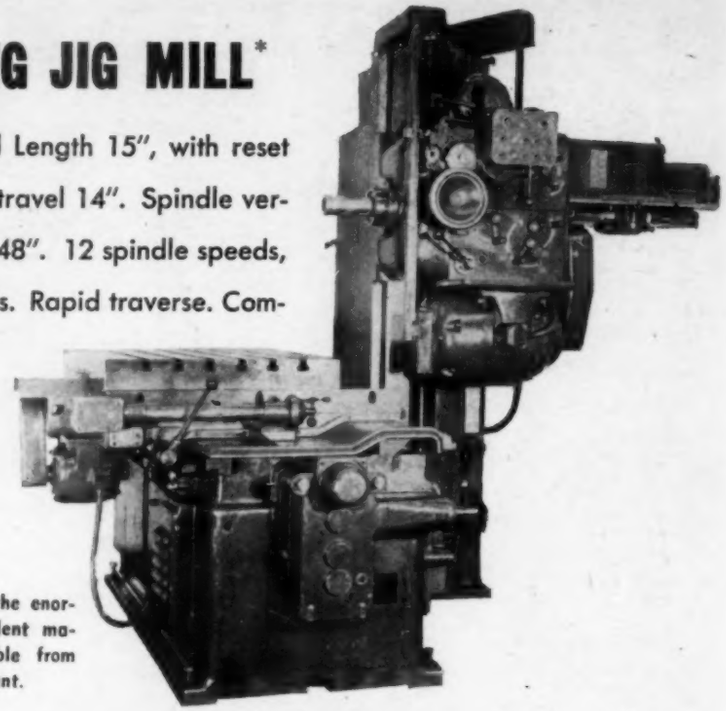

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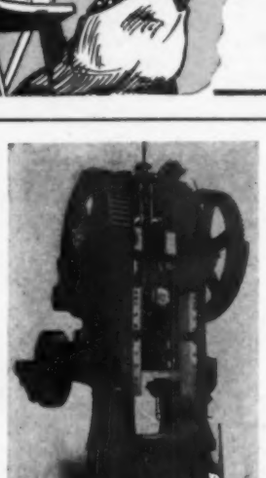

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62" KING VERTICAL BORING MILL with swivel head and turret head on rail. Variable speed motor with AC Motor Generator Set. Latest Type, practically new.

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LATHES CUTTERS Presses SHEAR Planers Shapers GRINDERS MILLERS

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1—Gomco 20" Univ. Shaper, new, stroke 20¾", strokes per min. 11-140, Horiz. trav. 24", vert. trav. 14", approx. wght. 5500 lbs.

★ **RADIAL DRILLS**
1—American 5'14"—32 speeds—Triple Purpose Radial Drill, extended colm., No. 5 Morse Taper, tumbler gear box, M.D.

★ **PRESSES**
1—Bliss No. 24, 400 Ton Knuckle Jointed Embossing Press, stroke 1½", shut height 12", width between uprights 21", width between gibs 16½", weight 18,500 lbs.
1—Toledo No. 666 Knuckle Jointed Embossing and Coining Press, capac. 1000 Ton, stroke 2", shut height 18", width betw. uprights 32", width between gibs 25", wght. approx. 90,000 lbs.

★ **MILLERS**
5—Cin. No. 2M Constant Speed Drive, Pl. Horiz. Millers, tbl. wkg. surf. 49"x10½", range: long. 28", cross 10", vert. 19", 12 spin. speeds, 29-419 RPM.

★ **TURRET LATHES**
1—Bardons & Oliver No. 5 Univ. Turret Lathe, capac. 2", sw. over bed 18", hole thru spin. 2⅝", 12 speeds, range: 38-1025 RPM, bar equip., very latest type.

★ **BORING MILLS**
1—Bullard 60" Vert. Bor. Mill, 2 heads, on cross rail, 40" clear under cross rail, tbl. 58" diam., vert. hed. trav. 24", arr. for M.D., AC elect. equip., removable chuck jaws, rap. trav., wght. approx. 17,000 lbs.

★ **PLANERS**
1—Putnam 84"x84"x40' Dbl. Hous. Planer, Revers., M.D., and controls, 2 heds. on cross rail, 2 side heds., just taken out of service.

★ **LATHES**
2—P. & W. 13"x30" Med. D, 8 speeds, grd. hed., motor in base, Eng. Lathe, with taper attmt., sw. 14", dist. betw. cons. 32".

★ **GRINDERS**
1—Mattison Hyd. Surf. Grinder, capac. 16"x24"x 72", with power raise and lower to vert. hed., Horiz. spin., complete with mag. chucks, latest type.

★ **AUTO. SCREW MACHINES**
1—Cenomatic 8 spindle, full automatic, capac. 1⅞"x6", with elect. equip. and tooling, latest type, shipped from fcty. 1945.

★ **MISCELLANEOUS**
1—Fairbanks-Morse, 2 cylinder, 2 cycle, 12"x15", Diesel Engine, Model No. 32E12, Generator capac. 76.8 KVA, 550 V, 3 phase, 60 cycle, capac. 120 HP.

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All Motor Driven—Guaranteed

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No. 350F—5" bar Giddings & Lewis Floor type HORIZONTAL BORING MILL

No. 26 Gleason Hypoid GEAR GENERATOR

No. 1 and No. 2 Brown & Sharpe UNIVERSAL GRINDERS

12"x16"x36", 14"x16"x60" Mattison SURFACE GRINDER

Model TG-125 J & L Automatic Internal Thread Grinder

20"x48" LeBlond Heavy Duty Geared Head LATHE

27"x48" LeBlond Heavy Duty Geared Head LATHES

36"x60" Lehmann Hydratrol Geared Head LATHE

36" x 108" Monarch Model NN Geared Head Lathe

No. 2SP, No. 3SP Van Norman PLAIN MILLERS

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No. 4 High Power Cincinnati PLAIN MILLERS

No. 4H, No. 4K Milwaukee PLAIN MILLERS

No. 9J Gorton VERTICAL MILLERS

No. 2, No. 3, No. 4 Cincinnati Dial Type VERTICAL MILLERS

No. 2H, No. 2K, No. 3H, No. 4H Milwaukee VERTICAL MILLERS

8"x10"" Bliss Rolling Mill

2" Acme-Gridley RAS-6 Six Spindle AUTOMATIC SCREW MACHINES

No. 3, No. 4 Gisholt Universal Geared Head TURRET LATHES

No. 2A, No. 3, No. 5, Warner & Swasey Universal Geared Head TURRET LATHES

No. 7A Jones & Lamson Universal Geared Head LATHE

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AUTOMATICS

2¾" RA-6 Acme-Gridley, New in 1943.
5½" Cleveland Model A, single spindle.
16" x 33" Fay Automatic Lathe.
1⅝"—8 Spindle Conomatic, New in 1942.

BORING MILLS

No. 31 Lucas Horizontal, m.d.

BROACHES

CPC 24 LaPointe Hyd., Vertical. New '45.
HP 20 LaPointe Hyd., Hrzntl. New '43.

DRILLS

★ **28" Cincinnati-Bickford Super Service Drill, box column type, with flanged quill unit, motor driven. Latest model.**
4' Canedy-Otto Radial Drill. New in 1946.
No. D2 Colburn, single spindle.
No. 314 Baker, single spindle.
42" Cincinnati-Bickford.
★ **No. 3B-12 Edlund, four spindle, back gear and semi-auto. power feed, m.d. New 1944.**
★ **No. 2LMS Leland Gifford Single spindle drill, with hand-hydraulic spindle feed, motor driven. New in 1943.**
★ **No. 3 Baush Multiple Drill, 20 spindle, No. 2 Morse taper, rectangular head 20" x 40".**

GEAR CUTTERS

No. 3 and No. 12 Barber-Colman Gear Hobbers.
No. 61 Fellows Gear Shaper, m.d.
No. 7125 & 715 Fellows Gear Shaper, m.d.
6" Gleason Str. Bevel Gear Generator.
★ **No. 3616 Cleveland Rigidhobber, spur or spiral gears to 42" diameter x 16" face, m.d. New in 1943.**

GRINDERS

No. 22 Heald Rotary Surface Grinder.
No. 18 Blanchard Surface Grinder. New in 1944.
No. 72A3 Heald Sizematic Intern. Grndr.
6 x18 Cincinnati Cylindrical. New in 1943.
10 x 36 Landis Plain Hyd. Cylindrical Grinder. New in 1943.
14" x 48" Cincinnati Plain Self contained Grinder, Filmatic-bearings.
No. 13 Brown & Sharpe Universal & Tool.
★ **No. 2 Cincinnati Centerless Grinders, with Filmatic spindle, some with through feed rest, others with in-feed; motor driven. New in 1940 and 1941.**
★ **Model B Thompson Hydraulic Surface Grinder, 10" x 24" capacity. New in 1942.**
14" x 60" Mattison Surface Grinder, Hydraulic. Late model.

LATHES, ENGINE

12" x 30" Pratt & Whitney, g.h.
10" x 20" Monarch EE Toolmakers Lathe. Latest model.
14" x 6' Sebastian, motor in base.

18—28" x 20' Centers Bertram "Time-saver" (Niles Pattern) Engine Lathes: Sixteen speed helical cut (MAAG type) geared head, quick change, screw cutting, with rapid traverse to carriage, some with taper attachment, all with chuck, motor and control. Latest model.

16" x 216" Landis Plain Hydraulic Grinder, Type B, with swivel table, dead type headstock spindle, power feed. New in 1941. Short use period.

★ **22" x 72" Monarch CM Lathe, flame hardened ways, anti-friction taper attachment. New in 1944.**
24" x 12' Monarch helical, g.h.
48" x 12' Lodge & Shipley, c.d.
IMP and LR Lo-Swing Lathe, m.d.
15" x 30" Lipe Carbo-matic. New in 1943.
17" x 50" LeBlond Production, m.d. New in 1942.

LATHES, TURRET

★ **No. 3L Gisholt, g.h. Cross sliding turret, taper attachment. New in 1943.**
No. 4A Warner & Swasey, g.h. New '42.
No. 3A Warner & Swasey, g.h.
No. 1A Warner & Swasey, g.h. New '43.
No. 4 Gisholt, Univrsl., g.h. New in 1943.
No. 3 Warner & Swasey, g.h. New 1943.
No. 1 Brown & Sharpe, m.d.
No. 6D Potter & Johnston.
42" Bullard VTL, New Era.

MILLS

No. 26 Van Norman, ram type, swivel head, new in 1943.
No. 3 Cincinnati Universal, motor in base, rectangular overarm.
No. 5 Cincinnati Plain High Power Model HO.
No. 4 K & T Milwaukee Plain. New in 1942.
No. 2 MH Cincinnati Plain, m.d.
★ **28" x 60" Cincinnati Vertical Hydrotel, single spindle, with profile tracing attachment, motor driven.**
No. 4 Cincinnati Vertical, high speed dial type, latest model.
No. 2 H Milwaukee Vert., motor in base.
No. 2 Cincinnati Vertical, motor in base, new in 1943.
No. 2209 Milwaukee Mill, table 22"x158".
No. 3-36"Cinci. Hydromatic Duplex, m.d.
Nichols Hand Mill, coolant equipment. New in 1943.

PLANERS AND SHAPERS

16" Gould & Eberhardt Crank Shaper.
20" American Crank Shaper, m.d.
★ **24" Ohio Extra Heavy Dreadnaught Shaper, universal table, rapid traverse, latest model.**
6" Pratt & Whitney Vertical Shaper.
No. 14 Cochrane & Bly Vertical Shaper.
42" x 42" x 20' Cincinnati Planer, D.C. Rev. M.D.

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QUALITY TOOLS

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16"x33" Fay with air operated tailstock. New 1942.

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20"x72" centers American Pacemaker. Taper attachment, collets, 2 chucks, pan & pump. Built 1946.

BORING MILL

4¾" bar, No. 300 Giddings & Lewis, floor type Vertical travel 82", horizontal travel 132", feed of bar 40" Has outer support and bed plate.

PLANER

98"x48"x12' Liberty with 2 rail and 1 side head. Has power rapid traverse, forced feed lubrication and variable voltage drive with MG set.

BROACH

No. HP50 Lapointe hydraulic with extension broach support. 25 ton capacity, 72" stroke. Built in 1940.

SENSITIVE DRILL

24" Allen 3 spindle No. 3 type VCPF with power feeds and back gears. New 1942.

TAPER SPLINE HOBBER

Type T Barber Colman wth long overarm with support at rear for long work. For splines or gears. New 1944.

CENTERLESS GRINDERS

Nos. 2 & 3 Cincinnati with Filmatic bearings, hydraulic profile truing. Built from 1940 to 1943.

CYLINDRICAL GRINDERS

6"x18" No. 10 Brown & Sharpe electric-hydraulic. Three have oscillating attachment.
New in 1941 and 1942.

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6"x18" & 10"x24" Norton hydraulic. New 1942.

TURRET LATHES

Nos. 3, 4 & 1L Gisholt. Built from 1942 to 1944.

VERTICAL TURRET LATHE

36" Bullard, spiral geared, built 1942. Also 24", 36" & 42" New Era type.

PLAIN MILLERS

No. 3 High Speed & No. 4 Medium Speed Cincinnati dial type horizontal. New in 1942.

MANUFACTURING MILLERS

No. 2-24" Cincinnati automatic. Nos. 3-36, 4-36, 4-48, 5-48, 5-60 and 5-80 duplex Cincinnati Hydramatic. Built from 1942 through 1944.

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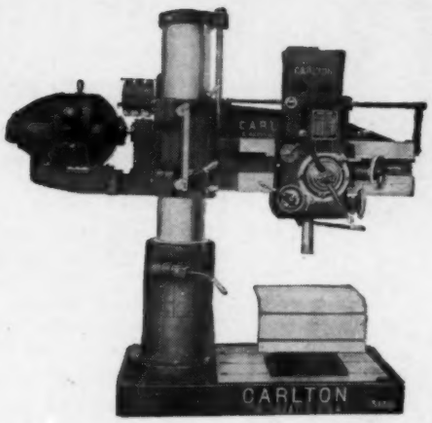

(See above) 7' Arm, 14" column CARLTON Plain with 10 HP, 230 V, DC motor and Westinghouse control. 84 spindle speeds RPM 19 to 1040.

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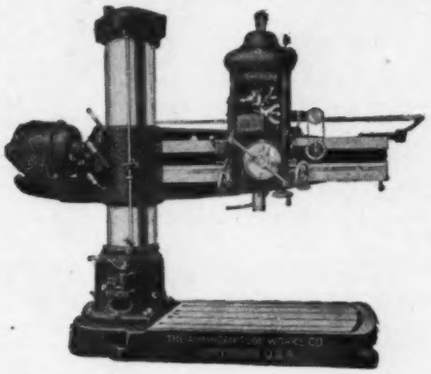

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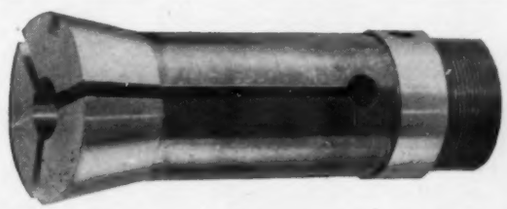

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#4 CINCINNATI "HI-POWER" Vert., M.D.
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#1H-12 KEARNEY & TRECKER MFG., M.D.
#M-50A TAYLOR & FENN Vert., M.D.
#12-M MOREY 2-spdle PROFILER, M.D.

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#0 B & S Wire Feed Screw Machines, M.D.
#26 Morey Ram Type, M.D.
#2 B & O Geared Elec., M.D.
#3 W & S Ram Type Univ., M.D.
#3 J & L Ram Type Univ., M.D.
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24"x14' L&S, Turner Uni-Drive
24"x16' L&S Selec. Grd. Hd., AC MD, taper
27"x14' AMERICAN Grd. Hd., AC MD

MILLERS

INDEX Vert., PF to table, AC MD
#2 MILWAUKEE Univ. SPD, DOA, Timken, PRT Div. Hds.
#3 CINCINNATI Univ., AC MD, Div. Hds., Vert. Attach., Slotting Attach.
#4B MILWAUKEE Plain, arr. MD, DOA, PRT
#3 CINCINNATI Med. Speed Dial Type Plain, AC MD, vert. hd. Miller.

SHAPERS

24" G&E Invincible, AC MD
24" AMERICAN Auto-Oiled, AC MD
32" G&E Invincible, AC MD

GRINDERS

#2-3 REID Surface, AC MD
#25A HEALD Rotary Surf., AC MD
#72A2 HEALD "Sizematic" Internal, AC MD
#2 BROWN & SHARPE Univ., arr. AC MD

MISCELLANEOUS

24"x36" BULLARD "New Era" VTL's, AC MD
#12 BARBER-COLMAN Gear Hobbers
3' CINCINNATI-BICKFORD Radial, gearbox, AC MD
7' DRESES Radial Drill, gearbox, AC MD
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#2 MITTS & MERRILL Keyseater
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DRILL, Hvy. Duty, No. 513 Baker, No. 6 M.T.
GEAR SHAPER, #75 Fellows, M.D.
GRINDER, Internal, No. 72A5 Heald, 2 Mtr.
GRINDER, Plain, 14"x72" Norton
GRINDER Plain 24"x240" Norton, M.D.
GRINDER, Surf. No. 3 Abrasive.
GRINDER, Surface No. 5 Abrasive, 14"x48".
GRINDER, Surf. Hyd. G & L, 14"x18"x72"
GRINDER, Surface, No. 25 Heald Rotary
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LATHE, 22"x18' Niles "Timesaver," Grd. Hd.
LATHE, 36"x22' N-B-P, Grd. Hd., Q.C.G.
LATHE, 38"x19' Putnam, Grd. Hd. Q.C.G., T.A.
LATHE, 42"x50' Putnam, Grd. Hd.
MILLER, Duplex 24" Cincinnati, Auto.
MILLER, Plain No. 3 Milwaukee, S.P.D.
MILLER, Plain, Nos. 3S, 4 & 5 Cincinnati.
MULT-AU-MATICS, Bullard Type A, 6 Spdle
PLANER, Openside, 36"x36"x12' Cleveland
PLANER, O.S. 72"x72"x23' Cleveland
SHAPER, 32" Gould & Eberhardt, M.D.
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Drills, sensitive, 2 and 4 Spindles
Drill, #25 Foot-Burt motor driven
Drills—New—18" Royal Motor driven (10)
Gear Cutter, Brown & Sharpe #2—26
Gear Cutter, Gould & Eberhardt 42"
Grinder, Webster and Perks #1-¾ motor drive
22" Buffalo Pr. Fd. Motor Drive, New
16"x6' Hendey Lathe, Quick Change Gear
Magic Chucks #1-2 & 3 and Collets
Pipe Machine, 3" Oster motor drive
Planer, 24"x24"x6' Pease motor drive
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#3SP Van Norman Miller 1942
Nos. 2, 3, 4, Cinci. Vert. Miller '42, '45
#2, 3, 4 & 5 W. & S. Univ. &
#3 J. & L. Univ. Turret Lathes
#712 Fellows Gear Generator, 1942
36H & 48H G.&E. Gear Hobbers
30" x 15' centers Amer. Super Pro. Lathe
18" raised to 24½" x 192" centers, BB Model Monarch, Carr. P. R. T., '42

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B. & S. No. 2 Vert., Swivel Head
Doall Surface Grinder with Selectron
Marvel No. 6A Hacksaw, M. D., Auto.
Injection Moulders, Hydraulic Presses

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Niles-Bement-Pond 4" duplex
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66" Niles; 54" Colburn, M.D. 2 hds.

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Gisholt No. 1L, 2L Univ. M.D.
Foster Nos. 4, 5, 6, 1B, 3B M.D. Univ.
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Acme #2 M.D.

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#25A Heald, M.D. like new.
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B. & S. No. 2, 2B Surface, M.D.
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Norton Hydraulic 12x18", M.D.
Heald Nos. 72A3 Gagematic
Norton 50"x28', M.D. Roll Grinder
Landis Type A 6x20" Hydraulic, M.D.
No. 55, 60, 65 Heald int., M.D.
12" Heald Rotary, Arter 12" M.D.
B. & S. No. 10 11 Cyl.; 1, 3 Univ.
Norton 6x18" Hyd. Surface, M.D.

LATHES
16"x8', South Bend, M.D. Late.
Monarch, Hendey 12x30, 16x42 G.H., Late
26x12' Boye & Emmes 3 step cone D.B.G.
14"x6' Hendey, Taper, Collets
9" LeBlond, P&W Auto.
36x30' Putnam M.D., 36x22', 42x16
32"x35' Wickes, M.D.
20"x30' Boye & Emmes Grd. Hd.,

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⅞" Cone 4 spindle, Gridley
B & S #0, No. 2 Hand Screw

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6x6" Racine Hacksaw
20 ton Northern Hydraulic Presses

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4', 5' 6' American Triple Purpose

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#12, #22L Van Norman Univ.
#2B K & T Univ.; No. 2A B & S Univ.
#2HL Milwaukee, M.D. late
No. 3S Cincinnati, S.P.D. rapid trav.
Nos. 0Y, 2, 3, 4, 5 B & S Plain & Univ.
Hall Planetary Model D Thread Miller
Becker Nos. 3, AB, 5, 6, Vert.
Nos. 2, 3, 4 Cincinnati Vert.
P. & W. No. 12, 30" Profiler, M.D.
B. & S. No. 1, 3, Vert.
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Norton 15"x15"x72" Surface
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LeBlond No. 2 Tool & Cutter
Norton No. 2 Tool & Cutter
Cincinnati No. 2 & No. 3 Centerless
Cincinnati No. 3 Centerless Lapper
Fitchburg 36" Spline Grinder
Blanchard No. 16—30"
Heald No. 25—A Rotary Surface
P. & W. 14" Vert. B.B.

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American 16"x6'—G.H.
Lodge & Shipley 20"x8' G.H.
Fitchburg 60"x22' LCG

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Cin. #2 Univ.
K & T #2HL & #4H Plain
Milw. No. 2B & 3B Double Overarm
B. & S. No. 0Y Production, #2 Plain
Cin. No. 2MH Plain; Nos. 3, 4 Vert.
Becker Model C. Vertical
B. & S. No. 3B & 5B Plain
Van Norman #2, #10, #20
Rice-Barton 4" Spline
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Cincinnati 18" & 24" Production
Sundstrand No. 1-18 and No. 2 Electromil.
P. & W. 6x14 & 6x72 Thread
Lees-Bradner 6"x36" Thread
Van Norman Duplex Nos. 0-2-20
Cincinnati #5 M.D. Plain
K&T #2K, 3K Vertical

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1000 ton Toledo Knuckle Joint
WF 3000 ton Hydraulic
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Henry & Wright 50 Ton Dieing

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Cincinnati—48"x48"x20' 3 Head

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Cleveland 1⅜" Model AA
W. & S. Nos. 1, 2, 2A, 3A Universal
Foster No. 7 and No. 1B
Cone 1¼" 4 Spindle
Cleveland 3¾" Model A, Latest Type
Cone 3½"—4 Spindle
Cleveland 6¾" Model A
Cleveland 7¾" & 8" Model A
Gridley ⅞", 1¼", 1¾", & 2⅝", Model G; 3¼" & 4¼"
Cleveland 2½", Model K

MISCELLANEOUS
Borematic—Heald No. 47-A
Boring Mill—Gisholt 30"
Boring Mill—Bullard 36" & 42" New Era
Boring Mill—Bullard 100" 2 Head

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Grinder, #2 Cin. Tool & Cutter, 3/60.
Grinder, #91-C. Coval Tool & Cutter, 3/60.
Grinder, 10x24" Landis Univ. Hyd., 3/60.
Grinder, Thread, Excello 30L, M.D.
Grinder, #1 B.&S. Universal, 3/60/220.
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(Continued from page 302)

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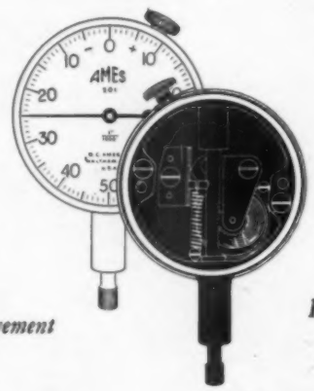

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INDEX OF PRODUCTS ADVERTISED IN THIS ISSUE

Abrasives.....28-29, 54, 75, 146, 274, 296

Balancing Machines 50

Bending Machines.....294

Books, Technical.....246, 270

Boring, Drilling & Milling Machines (Horizontal)..3rd Cover, 10-11, 52, 277

Boring Machines (Internal)....2nd Cover

Boring & Turning Machines (Vertical).....38-39, 42, 65, 196

Broaching Machines.....214, 221

Chucks.....189, 224, 254, 279, 282

Cleaners, Hand 174

Cleaning & Drying Machines & Supplies 177, 184, 237

Collets 280

Coolants Systems, Filters & Temperature Controls.....168, 232, 236

Cut-Off Machines; Sawing Machines...56, 242, 253, 322

Die Casting Machines.....213

Dressers, Grinding Wheel.....270

Drilling and Tapping Machines....16, 17, 70, 76, 79, 82, 182, 218, 231, 235, 278, 286

Engineering and Production Services..274

Exhibits.....32, 36-37, 80, 203

Fabricating Methods and Services....251

Finishing 227

Gages and Instruments..48, 142, 173, 178, 192, 259, 282, 286, 288, 290, 292, 316

Gear Cutters; Hobbing Machines..3, 7-8, 18-19, 240, 294

Gears, Speed Reducers, Motor Reducers.....26-27, 72, 193, 240, 241, 243, 244

Grinders, Lappers, Hones, Polishers, Buffers, Finishing Machines....4-5, 8-9, 14-15, 59, 66, 68, 76, 77, 78, 159, 204-205, 210, 238-239, 242, 246, 248, 260, 262, 265, 266, 267, 268, 287, 294

Heads: Drilling, Tapping & Grinding.260, 278, 295

Heat Treating Equipment and Supplies 186, 292

Insurance 222

Lathes, Automatic.....35, 74, 181

Lathes, Engine.....24, 58, 144, 151, 157, 245, 272, 282, 284, 290

Lathes, Turret.....22-23, 41, 234

Lubricating Systems & Equipment.....155

Lubricants, Cutting Fluids, Quenching Oils, Rust Preventives....55, 179, 191, 194, 200-201, 208, 226, 260, 266, 280, 297, 298

Materials, Cutting and Forming..163, 248

Materials of Manufacture.....4th Cover, 30-31, 49, 71, 161, 172, 209, 220, 229-230, 250, 269, 276, 285

Materials Handling Equipment—170, 186, 258, 268

Millers, Die Sinkers, Profilers.....20-21, 38-39, 76, 192, 249

Oil Purifiers & Coolers.....187

Parts and Equipment, Electrical..25, 73, 167, 175, 215, 247

Parts and Equipment, Hydraulic and Pneumatic.....183, 188, 211, 256, 268, 276, 291

Parts and Equipment, Mechanical..34, 47, 51, 53, 64, 153, 171, 190, 195, 216, 223, 228, 233, 252, 254, 257, 271, 272, 273, 275, 278, 281, 284, 292, 299, 301

Photographic Service, Materials.....288

Planers 33, 62

Presses, Forging and Forming Equipment and Supplies....61, 67, 84, 146, 185, 248, 258, 274, 284, 289, 292, 296

Production, Inventory and Tool Control 176

Riveting Machines.....270, 286

Screw Machines; Chucking Machines...22-23, 35, 41, 44-45, 202, 284

Shapers, Slotters, Keyseaters.....84, 184, 252, 282

Special Machine Tools.....12-13, 76, 254

Steel Blue.....244

Textiles 293

Threading Machines.....286

Tooling Set-up Equipment..40, 43, 63, 194, 262, 283, 288

Tools, Cutting....46, 57, 60, 69, 141, 166, 169, 180, 188, 197, 212, 219, 225, 240, 242, 250, 255, 256, 263, 264, 320

Tools, Hand.....261, 318

Tools, Portable.....190, 198, 199, 217, 266, 276

Welding and Cutting, Brazing & Soldering Equipment & Supplies..165, 262, 280

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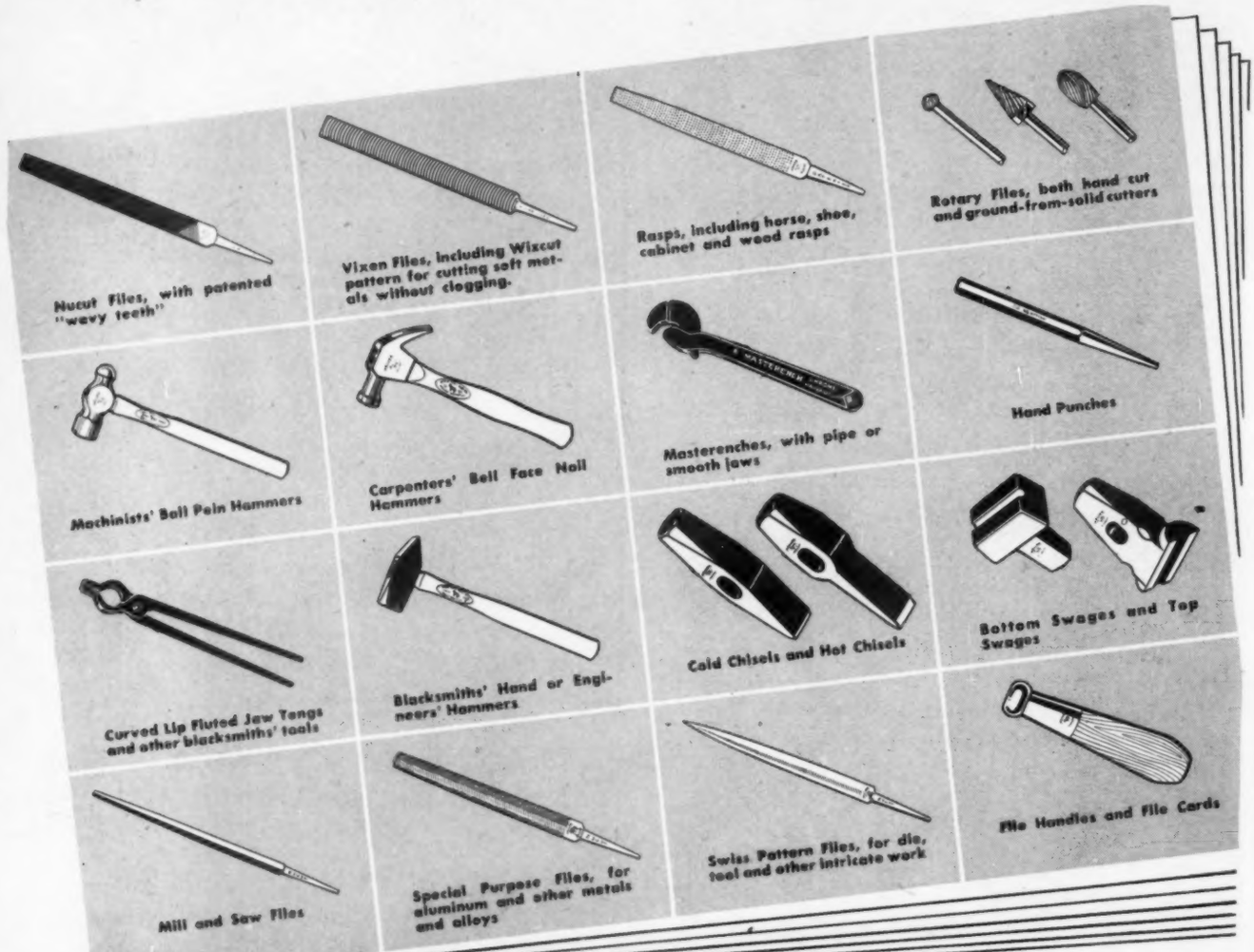
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ADVERTISERS INDEX

	Page
Abbott Ball Co.	252
Abrasive Machine Tool Co.	294
Adams Co.	72
Alemite	155
Allen Manufacturing Co.	252
Allied Products Corp.	195
Allis-Chalmers Manufacturing Co.	64
Almond Mfg. Co., T. R.	254
Aluminum Co. of America	49
American Brass Co.	229, 230
American Chain & Cable Co. Inc.	258
American Magnesium Corp.	71
American Screw Co.	153
American Steel & Wire Co.	53
American Tool Works Co.	16
American Wheelabrator & Equipment Corp.	177
Ames Co., B. C.	316
Anton Machine Works	286
Armstrong-Blum Mfg. Co.	56
Armstrong Bros. Tool Co.	40
Arter Grinding Machine Co.	242
Avey Drilling Machine Co.	203
Ball & Roller Bearing Co.	278
Bantam Bearings Div.	301
Barber-Colman Co.	18, 19
Barnes Drill Co.	235
Barrett Co., Leon J.	280
Baumbach Manufacturing Co., E. A.	296
Bearings Co. of America	254
Bilgram Gear & Machine Work	241
Black & Decker Mfg. Co.	217
Black Drill Co.	248
Blake Co., Edward	246
Blanchard Machine Co.	59
Blank & Buxton Machinery Co.	192
Bodine Corp.	202
Bokum Tool Co.	256
Boston Gear Works, Inc.	193
Boye & Emmes Machine Tool Co.	245
Braun Gear Co.	244
Brown & Sharpe Mfg. Co.	68, 256
Bryant Chucking Grinder Co.	78
Buffalo Bolt Co.	299
Bullard Co.	234
Canedy-Otto Mfg. Co.	17
Cartoloy Co., Inc.	163
Card Manufacturing Co., S. W.	250
Carlton Machine Tool Co.	286
Carroll & Jamieson Machine Tool Co.	284
Chicago Manufacturing & Distribution Co.	280
Cimcool Division, Cincinnati Milling Machine Co.	55
Cincinnati Bickford Tool Co.	79
Cincinnati Electrical Tool Co.	242
Cincinnati Gear Co.	244
Cincinnnati Grinders Incorporated	8, 9
Cincinnati Lathe & Tool Co.	24
Cincinnati Milling Mach. Co.	4, 5
Cincinnati Planer Co.	33
Cincinnati Shaper Co.	84
Cities Service Oil Co.	208
Clearing Machine Corp.	146
Clemson Brothers Inc.	242
Cleveland Twist Drill Co.	69
Columbia Steel Co.	53
Columbus Die Tool and Mach. Co.	254
Cone Automatic Machine Co.	35
Consolidated Machine Tool Corp.	42
Coulter Machine Co., James	286
Covel Mfg. Co.	66
Cross Co.	76
Cullen-Friestedt Co.	186
Cushman Chuck Co.	279
Danly Machine Specialties Inc.	67
Darnell Corporation	190
Davis & Thompson Co.	278
Davis Keyseater Co.	252
Dayton Rogers Mfg. Co.	258
DeLavel Separator Co.	236
Detroit Bevel Gear Co.	243
DeVlieg Machine Co.	52
Do All Co.	80
Dumore Co.	278
Dykem Co.	244
Earle Gear & Machine Co.	243
Eastern Machine Screw Corp.	197
Electric Storage Battery Co.	167
Employers Mutual Liability Ins. Co. of Wisconsin	222
Errington Mechanical Laboratory	260
Fairfield Manufacturing Co.	241
Fast Feed Machine Co.	248
Federal Products Corp.	259
Fellows Gear Shaper Co.	6, 7
Fiske Bros. Refining Co.	266
Fitchburg Grinding Machine Corp.	265
Fitzsimons Co.	269
Ford Chain Block Div. American Chain & Cable Co., Inc.	258
Fosdick Machine Tool Co.	70
Gallmeyer & Livingston Co.	266
Ganschow Gear Co.	243
Gardner Machine Co.	267
Gates Rubber Co.	271
General Electric Co. Apparatus Dept.	25, 73
Gerotor May Corporation	183
Giddings & Lewis Machine Tool Co.	277
Gisholt Machine Co.	50, 74
Gleason Works	3
Goss & de Leeuw Machine Co.	284
Grant Gear Works	241
Grant Mfg. & Machine Co.	286
Gray Co., G. A.	62
Gray-Mills Co.	190
Grobet File Co. of America	250
Hamilton Tool Co.	268
Hammond Machinery Builders Inc.	248, 260
Hanchett Manufacturing Co.	238, 239
Hansen Manufacturing Co.	233
Hardinge Brothers, Inc.	41
Harrison Radiator Div., Gen. Motors Corp.	187
Hartford Special Machinery Co.	243, 288
Haskins Co., R. G.	266
Heald Machine Co.	2nd Cover
Heller Brothers Company	318
Holman Reamer Co.	240
Honan-Crane Corp.	232
Hones, Inc., Charles A.	290
Independent Pneumatic Tool Co.	198, 199
Ingersoll-Rand Co.	261
J & S Tool Co.	270
James Manufacturing Co., D. O.	240
Johnson Bronze Co.	281
Kalamazoo Tank & Silo Co. Machine Tool Div.	188
Kearney & Tracker Corp.	38, 39
Kelley Gear & Tool Co.	244
Kempsmith Machine Co.	63
Kent-Owens Machine Co.	249
Kester Solder Co.	262
Kex National Service	174
King Machine Tool Co.	65
Kingsbury Machine Tool Co.	231
Knight Machinery Co., W. B.	196
L & S Bearing Co.	284
L. W. Chuck Co.	189
Landis Machine Co.	12, 13
Landis Tool Co.	14, 15
LaPointe Machine Tool Co.	214
Leach Machinery Co., Inc., H.	268
LeBlond Machine Tool Co., R. K.	144
Lee Co., K. O.	159
Leland-Gifford Co.	278
Linley Brothers Co.	270
Littell Machine Co., F. J.	284
Lodge & Shipley Machine Tool Co.	151
Lovejoy Tool Co., Inc.	320
Luers, J. Milton	294
Lufkin Rule Company	178
Machinery & Factory Equip. Co.	262
Maquinas Agricola "Roma" Ltda.	290
Mahon Co., R. C.	251
Marshalltown Mfg. Co.	292
Mattison Machine Works	287
McCaskey Register Co.	176

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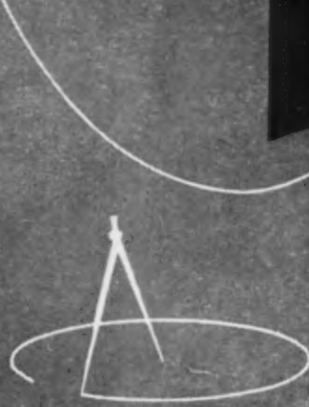


DESIGN

A complete engineering service, backed by an experienced staff, is at your service to make recommendations and design special cutters.

RANGE

Hundreds of sizes, dozens of models to meet every requirement, regardless of machines used or materials to be cut.

SERVICE

Even special tools use standard parts which are stocked by us. There are 20 Lovejoy service centers throughout the U.S.A. — there is one near you.

30 YEARS' SATISFACTION

Nearly 30 years' continuous experience making milling cutters and other "Positive-Locking" tools. Our first customers are still buying our tools.

LOVEJOY TOOL COMPANY, INC.
SPRINGFIELD, VERMONT, U. S. A.

ADVERTISERS INDEX

	Page
McGraw-Hill Book Co., Inc.	246, 270
Meisel Press Mfg. Co.	241
Micromatic Hone Corp.	204, 205
Mitts & Merrill	282
Monarch Machine Tool Co.	157
Monarch Steel Co.	269
Morris Machine Tool Co.	82
Motch & Merryweather Machry. Co.	253
National Acme Co.	44, 45
National Bearing Div. American Brake Shoe Co.	228
National Broach & Machine Co.	60
National Lock Washer Co.	257
National Machine Tool Co.	272
National Machinery Co.	289
Newark Gear Cutting Mach. Co.	240
New Britain-Gridley Mach. Div. New Britain Machine Co.	3rd Cover
Nelco Tool Co.	169
New Wrinkle Inc.	227
Niagara Machine & Tool Works	185
Nice Ball Bearing Co.	171
Nicholson File Co.	225
Nicholson & Co., W. H.	188
Norma-Hoffmann Bearings Corp.	273
North Bros. Mfg. Co.	194
Norton Company	48, 75
O. K. Tool Co.	219
Oakite Products Inc.	237
Oilgear Co.	221
O'Neil-Irwin Mfg. Co.	294
Optimus Equipment Co.	184
Parker Appliance Co.	291
Parker-Kalon Corp.	275
Patt Bros. Co.	288
Pawtucket Mfg. Co.	272
Peninsular Grinding Wheel Co.	28, 29
Permanente Products Co.	30, 31
Photographers' Ass'n of America	288
Pines Engineering Co., Inc.	322
Pittsburgh Gear & Machine Co.	244
Potter-Johnston Machine Co.	22, 23
Pratt & Whitney Div., Niles-Bement-Pond Co.	32
Precision Gear Co.	240
Production Machine Co.	262
Randall Co., Frank E.	290
Red Wing Motor Co.	290
Reeves Brothers Inc.	293
Reliance Electric & Engineering Co.	175
Republic Steel Corp.	285
Revere Copper & Brass Inc.	161
Robbins Engineering Co.	283
Robertson Mfg. Co.	54
Ryerson & Sons Inc., Joseph T.	172
Sales Service Machine Tool Co.	184
Scherr Co., Inc., George	282
Scully Jones & Co.	295
Seneca Falls Machine Co.	181
Sheldon Machine Co., Inc.	272
Shore Instrument & Mfg. Co., Inc.	292
Sibley Machine & Foundry Corp.	182
Simonds Abrasive Co.	148
Sinclair Refining Co.	191
Skinner Chuck Co.	224
Smit & Sons, Inc., J. K.	274
Snow Manufacturing Co.	218
South Bend Lathe Works	58
Southeastern Castings Co.	274
Springfield Machine Tool Co.	282
Square D. Co.	247
Stahl Gear & Machine Co.	240
Standard Conveyor Co.	170
Standard Machinery Co.	274
Standard of California	226
Standard Oil Co. (Indiana)	297, 298
Standard Pressed Steel Co.	34
Staples Tool Co.	57
Standard Tool Co.	263, 264
Star Electric Motor Co.	215
Stewart Warner Corp.	155
Strand Co., N. A.	276
Strong Carlisle & Hammond Co.	292
Stuart Oil Co., Ltd., D. A.	194
Sundstrand Machine Tool Co.	20, 21
Sunbeam Corporation	165
Sunnen Products Co.	210
Sun Oil Company	200, 201
Taft-Peirce Mfg. Co.	173
Tennessee Coal, Iron & Railroad Co.	53
Thermo Electric Mfg. Co.	186
Thompson Grinder Co.	77
Threadwell Tap & Die Co.	141
Tidewater Associated Oil Co.	179
Timken Roller Bearing Co. (Steel & Tube Div.)	4th Cover
Timken Roller Bearing Co.	51
Tinnerman Products Inc.	223
Torrington Co. (Bantan Bearings Div.)	301
Torrington Co.	292
Tube Turns Inc.	220
Tubular Micrometer Co.	192
Tungsten Electric Co.	255
Tuthill Pump Co.	276
Union Twist Drill Co.	46
United Precision Prod. Co.	280
United States Air Compressor Corp.	211
U. S. Hoffman Machinery Corp.	168
U. S. Steel Corp.	53, 276
U. S. Steel Export Co.	53
U. S. Steel Supply Co.	276
V. & O. Press. Co.	296
Valvair Corp.	268
Van Norman Co.	10, 11
Vascaloy-Ramet Corp.	212
Veeder-Root Inc.	47
Vitrified Wheel Co.	296
Walker Co., Inc., O. S.	282
Waltham Machine Works	294
Warner & Swasey Co.	36, 37
Webber Gage Co.	142
Weldon Tool Co.	166
Wendt-Sonis Co.	180
Westinghouse Electric Corp.	26, 27
Wheelock Lovejoy & Co., Inc.	250
White & Bagley Co.	260
Whitney Chain Mfg. Co.	216
Wickes Brothers	213
Williams & Co., J. H.	43
Wilson, K. R.	61
Wilson Mechanical Inst. Co.	282
Woodworth Co., N. A.	288, 296
Wyckoff Steel Co.	209
Zek E. Hahnemann Co.	296

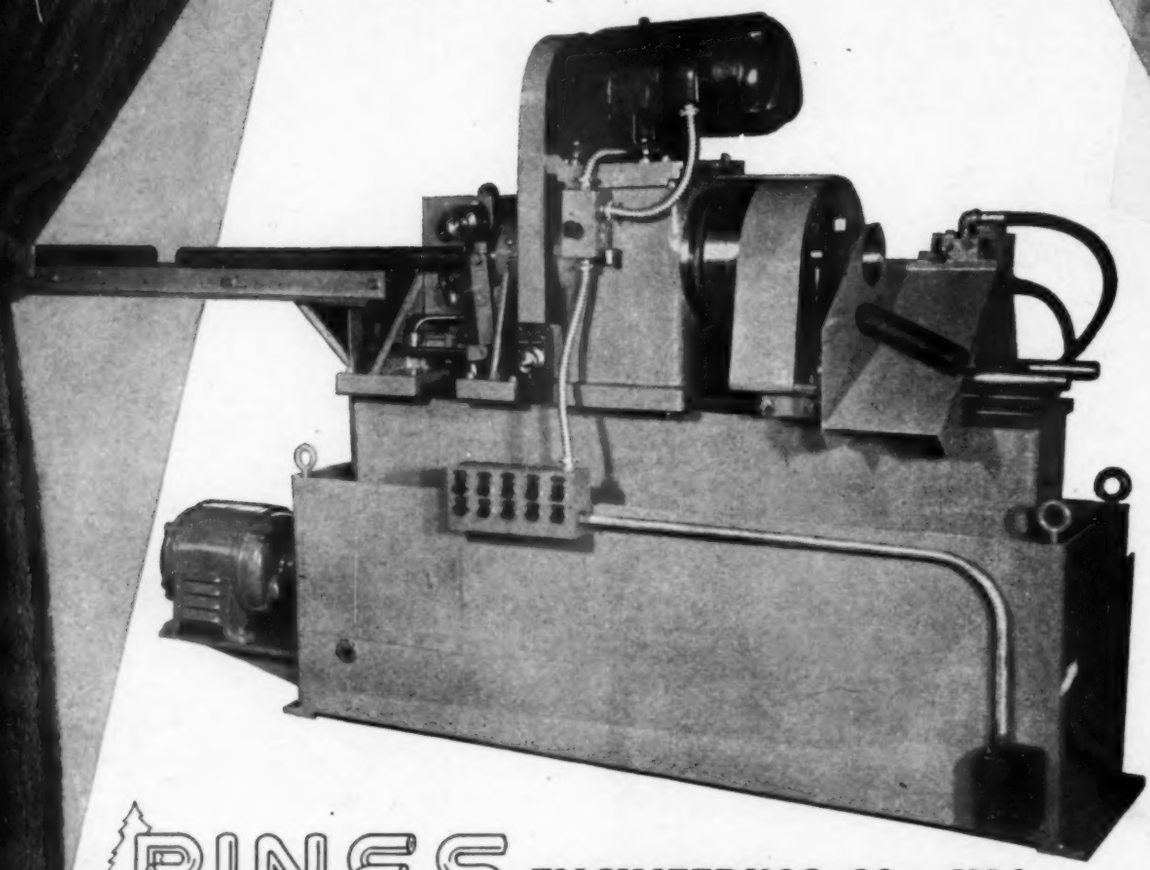
SEARCHLIGHT SECTION
Classified Advertising

Classification	Page
POSITIONS VACANT	302, 314
SELLING OPPORTUNITIES OFFERED	302
POSITIONS WANTED	314
SELLING OPPORTUNITIES WANTED	314
EMPLOYMENT SERVICES	314
CONTRACT WORK	302
Aspegren Manufacturing Co., Inc.	302
Buehrle & Son, Inc., Phillip H.	302
General Pattern Works	302
Kokomo Machine Co.	302
Lembo Machine Works	302
Lunds Sons, J. B.	302
Madison Machine Co.	302
Metomic Corp.	302
Orscheln Brake Lever Mfg. Co.	302
Pauls Machinery Co.	302
Park Sprinkler Mfg. Co.	302
Possey's Tool & Mfg. Co.	302
BUSINESS OPPORTUNITIES OFFERED	314
EQUIPMENT (Used or Surplus New) WANTED	314
FOR SALE	303-315
Aaron Machinery Co.	306, 310, 313
Aspegren Manufacturing Co., Inc.	314
Bennett Machinery Co.	312
Billard Machine & Tool Co.	315
Botwinik Bros. Inc.	313
Botwinik Bros. of Mass.	309
Brooks Inc., B. D.	308
Brownell Hazard	315
Cadillac Motor Car Division—General Motors	314
Cox Machinery Co.	312
DeWitt Tool Co.	311
Dony Machinery Co.	306
Eastern Machinery Co.	307
Emerman Machinery Co.	308
Falk Machinery Co.	303
Farnham Mfg. Co.	314
Galbreath Machinery Co.	313
Graff Machine & Tool Co.	311
Hasco Machinery Co.	312
Hill-Clarke Machinery Co.	306
Hyman & Son, Joseph	315
Indianapolis Machinery & Supply Co.	310
Koontz, H. J.	315
Lafayette Saw & Knife, Inc.	314
Lang Machinery Co.	312
Lucas & Son, Inc., J. L.	309
Miles Machinery Co.	310
Morey Machinery Co.	304, 305
Murphy Co., Joseph E.	314
National Machinery Exchange	312
Noll Equipment Co.	315
O'Connell Machinery Co.	308
O'Brien Machinery Co., The	315
Osborne & Sexton Machinery Co.	312
Ott Machinery Sales Inc.	315
Pauls Motor & Machinery Co.	306
Reynolds Machinery Co.	308
S & S Machinery Co.	308
Simmons Machine Tool Co.	311
Victor Machinery Exchange Inc.	311
West Penn Machinery Co.	310
Wigglesworth Machinery Co.	312, 315
Winston Machine Co., Inc.	309, 310, 312, 313
Wolverine Fabricating & Mfg. Co., Inc.	314

Presenting

THE NEW PINES
Automatic
CUT-OFF MACHINE

This hydraulic type rotary machine cuts tubing and pipe quicker and cleaner than any other machine in the world. ½" to 2⅞" O.D tubing feeds through the hollow spindle at 250 feet a minute against the easily adjustable receding target stop to determine length. No waste in butt ends; push-type collets chuck work while interchangeable parting tool bits or cut-off discs rotate. Feed rolls require no set up changes for any diameter within machine range. Full automatic operation when equipped with power driven conveyor—one operator can operate several machines. . . . This machine represents years of development to complete the PINES line of tube working machinery so write for complete details.



PINES ENGINEERING CO., INC.

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SPECIALISTS IN TUBE FABRICATING EQUIPMENT

Announcing

A NEW LINE OF PRECISION CONTOUR TURNING AND BORING MACHINES

Accurate and Fast — Cam and Air Actuated

Featuring **1.** An endless variety of contours or combinations may be generated with a single-point tool. Besides all the regular jobs of straight precision boring and turning, facing and chamfering, it will produce lands, recesses, flanges, steps, counterbores, and radii.

2. A disc type cam for each table gives positive action consistently throughout the day — from the first to the last piece—uninfluenced by temperature changes.

3. Through positive cam action, tool approaches on rapid traverse to within .005 of the work and immediately starts to feed. Tool may cut on feed-in or drawback stroke, or both for rough and finish cuts. On return stroke, tool jumps clear eliminating drag off marks. When moving between intermittent or successive cuts, tool goes into rapid traverse.

4. Uniform temperature, anti-friction bearings, and super-precision spindles provide spindle speeds up to 7,500 RPM. Mechanical precision chucking operated by air cylinders. Neither chucking nor unchucking operation affects preload or position of spindle bearings.

5. Only one dimension need be inspected on any one set-up, regardless of the number of diameters produced by any one single-point tool. Cams control and positively repeat from piece to piece.

6. Set-up of machine depends entirely upon nature of job. Work may be rotated in spindles or mounted on table, loaded from the front of the spindle or through the spindle. Spindles may be raised, lowered, or separated. Two spindles are standard, but more may be added. Changing job set-up simply requires replacing two cams, setting tool for size and changing chucks.

THE NEW BRITAIN MACHINE CO. N B

IN THE MIDST OF EVERYTHING AT THE SHOW

You may see this machine in operation in our Booth No. 311 at the Show. We will also have a complete line of six spindle automatic screw machines, four, six and eight spindle chucking machines, a double end chucker, and a new revolutionary turret lathe. We'll be seeing you September 17.

M-01060

NEW BRITAIN

Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

Rotorolled tubing
Rotorolled tubing is a cold worked product. The machines pictured here are used to produce Timken Rotorolled Seamless Tubing from ¼" to 3¼" O.D. with exceptionally close wall tolerances and a smooth finished surface. This method of cold working tubes also increases their machinability.
Tube and bar cutting
Pictured below are some of the cut-off machines operated in pairs. In addition to this equipment there are abrasive saws, cracker shears and circular saws. This equipment is capable of cutting bars and tubes from ½" to 10½" O.D. Shown at the top is a close-up of this operation.
Rotorolled quality starts in the melt shop

Have you read the inside story

of the Timken Steel and Tube Division?

MAYBE you aren't familiar with the facilities and products that make The Timken Roller Bearing Company an outstanding source of fine alloy steels. Whether you are or not, as a user of alloy steels, you'll be interested in the complete inside story of the unique Timken Company steel plant—as presented in our fully-illustrated, 68-page booklet, "Timken Steel and Tube Division, Facilities and Products". Detailed and informative, it describes the melting, drawing, hot rolling, annealing and other facilities which give our specialty mill the flexibility needed to produce the specific alloy steels you want. It also lists in convenient form the complete range of available sizes, analyses and finishes of Timken steel products. You'll find this book a useful supplement to your "Classification of Extras", sent without charge. Just address your request on your firm's letterhead to Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

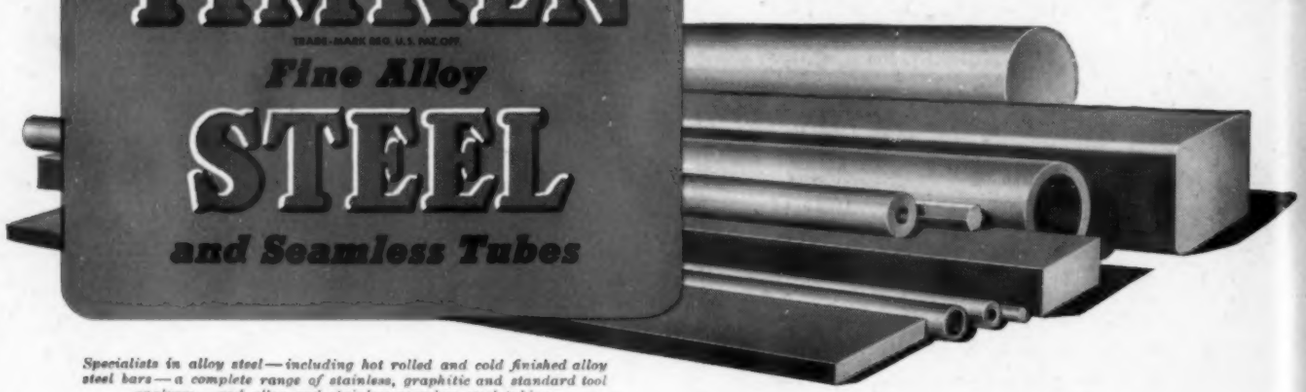
TIMKEN

TRADE-MARK REG. U.S. PAT. OFF.

Fine Alloy

STEEL

and Seamless Tubes



Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.